QLOGIC®
The Ultimate in Performance

iSR6152
Intelligent Storage Router

Installation Guide

ISR651103-00 C

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Removed the “Topology” section (SmartWrite not currently supported).	Chapter 2 Planning
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Preface

This guide describes the features and installation of the QLogic iSR6152 Intelligent Storage Router (iSR6152), also referred to as the *iSR6152 router* or simply *router*.

Intended Audience

This guide is for users who are responsible for installing, managing, and servicing the iSR6152 router and the storage area network (SAN) equipment to which it is attached.

What's in This Guide

This guide contains the information needed to plan for the iSR6152 router, to install and configure the router, software, and firmware, and to troubleshoot possible problems. It also provides details about how the router uses Simple Network Management Protocol (SNMP), and lists log messages that you may encounter.

This preface specifies the intended audience, explains the typographic conventions used in this guide, and lists related documents. In addition, the preface provides communications statements and safety information, lists accessible parts, defines license agreements, and explains how to obtain technical support.

The remainder of this guide is organized into the following chapters and appendices:

- Chapter 1 Introduction describes the features and capabilities of the iSR6152 router.
- Chapter 2 Planning describes how to plan for the iSR6152 router.
- Chapter 3 Installation provides procedures for installing and configuring an iSR6152 router, and installing the firmware.
- Chapter 4 Diagnostics and Troubleshooting provides guidance to diagnostic information about the router available through the chassis LEDs and the port LEDs, as well as through Router Manager and command line interface (CLI) event logs and error messages.

- Chapter 5 Removal and Replacement provides procedures for removing and replacing the field replaceable units (FRU): SFP transceivers and iSR6152 routers.
- Appendix A Simple Network Management Protocol (SNMP) provides reference material for the simple network management protocol (SNMP) protocol, which you can use to manage the iSR6152 router using a third-party SNMP management application.
- Appendix B Log Messages provides reference material on messages logged to a file, which you can retrieve using the Router Manager or CLI.

Following the appendices are a glossary of terms used and an index that will help you quickly find the information you need.

Related Materials

Refer to the following documents for additional information:

- *iSR6152 Intelligent Storage Router Quick Start Guide*
- *iSR6152 Router CLI User's Guide*
- *iSR6152 Router Manager User's Guide*
- *Internet Protocol, Version 6 (IPv6) Specification*, RFC2460
- *Neighbor Discovery for IP Version 6 (IPv6),* RFC2461
- *IPv6 Stateless Address Autoconfiguration*, RFC2462
- *Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification*, RFC2463
- *Transmission of IPv6 Packets over Ethernet Networks*, RFC2464
- iSCSI draft standard draft-ietf-ips-iSCSI-20
- *Internet engineering task force (IETF) – iSCSI Requirements and Design Considerations, iSCSI Naming and Discovery, Internet Protocol Specification (IPv4)*, RFC793
- *Transmission Control Protocol (TCP) Specification, RFC1122, Requirements for Internet Hosts-Communication Layers*
- *TCP Extensions for High Performance*, RFC1323
- *TCP Congestion Control*, RFC2581
- *NewReno Modification to TCP's Fast Recovery Algorithm*, RFC2582

- *ANSI SCSI – SCSI-3 Architecture Model (SAM), X3T10/994D/Rev 18, SCSI-3 Controller Command Set, X3T10/Project 1047D/Rev 6c. IEEE – 802.1Q Virtual LAN (VLAN), 802.1p Priority of Service, 802.3x Flow Control, 802.3ad Link Aggregation*
- *SCSI-3 Fibre Channel Protocol (SCSI-FCP)*, X3.269:1996
- *Fibre Channel Physical and Signaling Interface (FC-PH)*, X3.230:199
- *Fibre Channel 2nd Generation (FC-PH-2)*, X3.297:1997
- *Third Generation Fibre Channel Physical and Signaling Interface (FC-PH-3), X3.303:1998, Fibre Channel-Arbitrated Loop (FC-AL-2)*, working draft, revision 6.4, August 28, 1998
- *Fibre Channel Fabric Loop Attachment Technical Report (FC-FLA) NCITS/TR-20:1998, Fibre Channel-Private Loop Direct Attach Technical Report (FC-PLDA)*
- *SCSI Fibre Channel Protocol-2 (FCP-2)* working draft, revision 3, October1, 1999
- *Fibre Channel over TCP/IP (FCIP)*, RFC3821
- *ANSI Information Technology-SCSI 3 Architecture Model*, revision 18, November 27, 1995

Documentation Conventions

This guide uses the following documentation conventions:

- ***NOTE:*** provides additional information.
- ***CAUTION!*** indicates the presence of a hazard that has the potential of causing damage to data or equipment.
- ***WARNING!!*** indicates the presence of a hazard that has the potential of causing personal injury.
- Text in blue font indicates a hyperlink (jump) to a figure, table, or section in this guide, and links to Web sites are shown in underlined blue. For example:
  - Table 9-2 lists problems related to the user interface and remote agent.
  - See “Installation Checklist” on page 3-6.
  - For more information, visit www.qlogic.com.

- Text in **bold** font indicates user interface elements such as a menu items, buttons, check boxes, or column headings. For example:
  - Click the **Start** button, point to **Programs**, point to **Accessories**, and then click **Command Prompt**.
  - Under **Notification Options**, select the **Warning Alarms** check box.
- Text in `Courier` font indicates a file name, directory path, or command line text. For example:
  - To return to the root directory from anywhere in the file structure:

    Type `cd /root,` and then press ENTER.
  - Enter the following command:

    ```
    sh ./install.bin
    ```
- Key names and key strokes are indicated with UPPERCASE:
  - Press CTRL+P.
  - Press the UP ARROW key.
- Text in *italics* indicates terms, emphasis, variables, or document titles. For example:
  - For a complete listing of license agreements, refer to the *QLogic Software End User License Agreement*.
  - What are *shortcut keys*?
  - To enter the date, type *mm/dd/yyyy* (where *mm* is the month, *dd* is the day, and *yyyy* is the year).
- Topic titles between quotation marks identify related topics either within this guide or in the help system.

Communications Statements

The following statements apply to this product. The statements for other products intended for use with this product appear in their accompanying manuals.

Federal Communications Commission (FCC) Class A Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area may cause unacceptable interference, in which case the user will be required to correct the interference at their own expense.

Neither the provider nor the manufacturer is responsible for any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause unwanted operation.

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This equipment does not exceed Class A limits for radio emissions for digital apparatus, set out in Radio Interference Regulation of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps necessary to correct the interference.

Avis de conformité aux normes du ministère des Communications du Canada

Cet équipement ne dépasse pas les limites de Classe A d'émission de bruits radioélectriques por les appareils numériques, telles que prescrites par le Réglement sur le brouillage radioélectrique établi par le ministère des Communications du Canada. L'exploitation faite en milieu résidentiel peut entraîner le brouillage des réceptions radio et télé, ce qui obligerait le propriétaire ou l'opérateur à prendre les dispositions nécwssaires pour en éliminer les causes.

CE Statement

The CE symbol on the equipment indicates that this system complies with the EMC (Electromagnetic Compatibility) directive of the European Community (89/336/EEC) and to the Low Voltage (Safety) Directive (73/23/EEC). Such marking indicates that this system meets or exceeds the following technical standards:

- EN60950-1, A11:2004 – “Safety of Information Technology Equipment, Including Electrical Business Equipment”.
- EN 55022:1998, A1:2000, A2:2003 – “Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment”.
- EN 55024:1998, A1:2001, A2:2003 – “Electromagnetic compatibility - Generic immunity standard Part 1: Residential commercial, and light industry.”
  - EN 61000-4-2: 1995, A1:1998, A2: 2001 – “Electrostatic Discharge Immunity Test”
  - EN 61000-4-3: 2002 – “Radiated, Radio-Frequency, Electromagnetic Field Immunity Test”
  - EN 61000-4-4: 1995, A1:2001, A2:2001 – “Electrical Fast Transient/Burst Immunity Test”
  - EN 61000-4-5: 1995, A1:2001 – “Surge Immunity Test”
  - EN 61000-4-6: 1996, A1:2001 – “Immunity To Conducted Disturbances, Induced By Radio-Frequency Fields”
  - EN 61000-4-8: 1993, A1:2001 – “Power Frequency Magnetic Field Immunity Test”
  - EN 61000-4-11 Second Edition: 2004 – “Voltage Dips, Short Interruptions And Voltage Variations Immunity Tests”
- EN 61000-3-2: 2000 – “Limits For Harmonic Current Emissions (Equipment Input Current Less Than/Equal To 16 A Per Phase)” Class A
- EN 61000-3-3: 1995, A1:2001 – “Limitation Of Voltage Fluctuations And Flicker In Low-Voltage Supply Systems For Equipment With Rated Current Less Than Or Equal To 16 A”

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This is a Class A product based on the standard of the Voluntary Control Council For Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Laser Safety Information

This product may use Class 1 laser optical transceivers to communicate over the fiber optic conductors. The U.S. Department of Health and Human Services (DHHS) does not consider Class 1 lasers to be hazardous. The International Electrotechnical Commission (IEC) 825 Laser Safety Standard requires labeling in English, German, Finnish, and French stating that the product uses Class 1 lasers. Because it is impractical to label the transceivers, the following label is provided in this manual.

Electrostatic Discharge Sensitivity (ESDS) Precautions

The assemblies used in the switch chassis are ESD sensitive. Observe ESD handling procedures when handling any assembly used in the switch chassis.

Accessible Parts

The following field replaceable units (FRUs) are supported by the iSR6152 router:

- Small form-factor pluggable (SFP) optical transceivers

License Agreements

Refer to the *QLogic Software End User License Agreement* for a complete listing of all license agreements affecting this product.

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QLogic routers are powered by the Linux operating system. A machine-readable copy of the Linux source code is available upon written request to the following address. A nominal fee will be charged for reproduction, shipping, and handling costs in accordance with the General Public License.

QLogic Corporation
26600 Aliso Viejo Parkway
Aliso Viejo, CA 92656
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1 Introduction

This chapter describes the following features and capabilities of the iSR6152 router:

- "Router Capabilities" on page 1-1
- "Licensed Feature—Data Migration" on page 1-2
- "Fibre Channel over IP (FCIP)" on page 1-2
- "Chassis LEDs" on page 1-3
- "Chassis Controls" on page 1-4
- "Fibre Channel Ports" on page 1-6
- "Fibre Channel SFP Transceivers" on page 1-7
- "GbE Port LEDs" on page 1-8
- "Ethernet Management Port" on page 1-9
- "Serial Port" on page 1-9

Router Capabilities

Figure 1-1 shows the front of the iSR6152 Intelligent Storage Router.

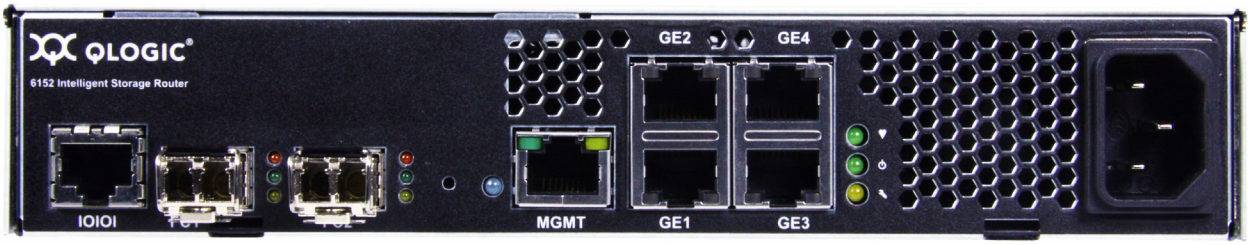


Figure 1-1. iSR6152 Router

The iSR6152 is a bi-directional Fibre Channel to gigabit Ethernet (GbE) router. It supports the following topology:

- FCIP, Fibre Channel over IP (see page 1-2)

When using the iSR6152 to connect two Fibre Channel SANs, E_Ports are not required on the Fibre Channel switches. This allows you to connect multi-vendor Fibre Channel SANs (switches) without concern for the compatibility of the E_Ports and N_Ports between different switch vendors.

The iSR6152 also has optional, additional servers and ports to expand connectivity.

Licensed Feature—Data Migration

The iSR6152 router also provides data migration as an optional, licensed feature.

The iSR6152-based data migration feature is block-based and independent of a SAN, server, storage protocol (Fibre Channel and iSCSI), and storage vendor. Because application downtime during data migration is always critical, iSR6152 data migration supports both online (local and remote) and offline data migration across Fibre Channel and iSCSI storage arrays. Even offline data migration using the iSR6152 is designed to minimize application downtime by allowing you to configure all migration related tasks while the application remains online, and to migrate the data at a very high speed while the application is offline. This feature is designed such that any person with knowledge of SAN or SAN storage administration can migrate data.

Fibre Channel over IP (FCIP)

The iSR6152 router supports Fibre Channel over IP (FCIP). The FCIP protocol as implemented in the router is not guaranteed nor has it been tested to be compatible with other vendor FCIP implementations. The router supports up to two FCIP routes; each route requires a dedicated Fibre Channel and GbE port pair.

- Merge Fibre Channel fabrics over LAN or WAN
- N_Port to fabric over LAN or WAN
- N_Port to N_Port over LAN or WAN

FCIP is generally used as an inter-switch link (ISL) between local and remote SANs. The ISL enables the SAN fabrics to merge, and requires that both SANs use compatible Fibre Channel switches (typically from the same vendor).

FCIP can also operate as an N_Port extender to connect a remote Fibre Channel device into a SAN. This configuration requires a direct connection between the remote router and the Fibre Channel device.

Chassis LEDs

The chassis LEDs shown in Figure 1-2 provide information about the router's operational status. These LEDs include the input power LED, heartbeat LED, and the system fault LED. To apply power to the router, plug the power cord into the router AC power receptacle and into a 100 VAC to 240 VAC, 50 Hz to 60 Hz power source.

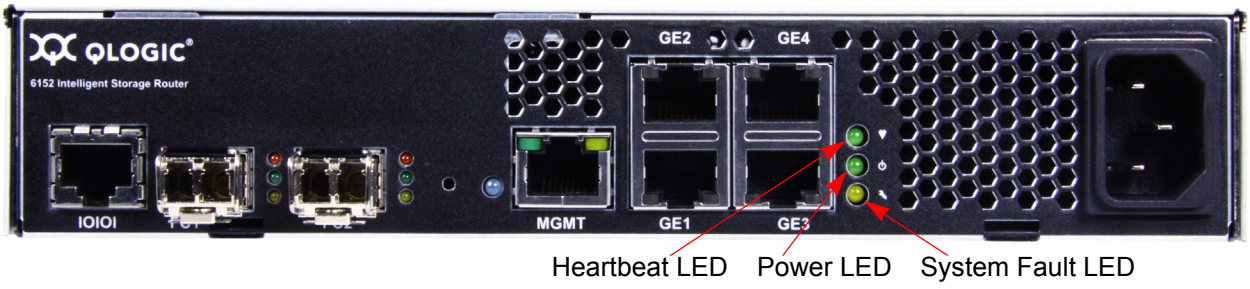


Figure 1-2. Chassis LEDs

Input Power LED (Green)

The power LED shows the voltage status at the router logic circuit board. During normal operation, this LED lights up to show that the router logic circuit board is receiving the DC voltage from the power supply.

Heartbeat LED (Green)

The heartbeat LED blinks once per second as long the router firmware is operational.

System Fault LED (Amber)

The system fault LED lights up to show that a fault exists in the router firmware or hardware. Fault conditions include POST errors and over-temperature conditions. The LED shows a blink code for POST errors and the over-temperature condition. See Figure 1-2 and Table 1-1.

Table 1-1. System Fault LED Blink Patterns

System Fault LED	Condition
Off	Okay (operational)
3 Blinks	System error
4 Blinks	Management port IP address conflict
5 Blinks	Over temperature

Table 1-1. System Fault LED Blink Patterns (Continued)

System Fault LED	Condition
1 Blink	Beacon, synchronized with the heartbeat LED

Chassis Controls

The maintenance button shown in Figure 1-3 is the only chassis control. Pressing this button resets the router or recovers the router if it has become disabled.

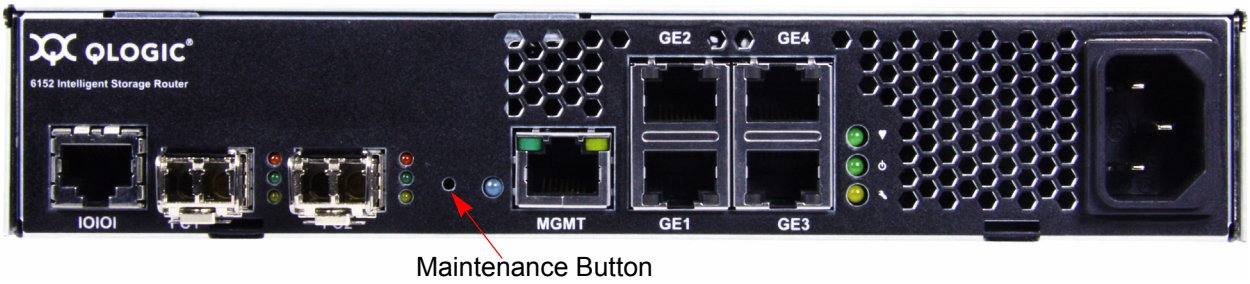


Figure 1-3. Chassis Controls

Maintenance Button

The maintenance button is a multifunction momentary switch on the front panel. It has the following functions:

- Reset a Router (see page 1-5)
- Reset and Select Boot Image (see page 1-5)
- Reset IP Address (see section page 1-5)
- Enable DHCP (see section page 1-5)
- Restore Factory Defaults (see page 1-5)

Reset a Router

To reset the router, use a pointed, nonmetallic tool to momentarily press and release (less than two seconds) the maintenance button. The router responds as follows:

1. All the chassis LEDs light up.
2. After about two seconds, the POST begins, turning off the heartbeat and system fault LEDs.
3. When the POST is complete, the power LED is on and the heartbeat LED flashes once per second.

Reset and Select Boot Image

You can reset the router using either the primary or secondary boot image:

- **Primary Image.** To reset the router and select the primary boot image, use a pointed, nonmetallic tool to press and hold the maintenance button until the heartbeat LED flashes once, and then release the button. The router boots from the primary boot image. The boot time is less than one minute.
- **Secondary Image.** To reset the router and select the secondary boot image, use a pointed, nonmetallic tool to press and hold the maintenance button until the heartbeat LED flashes twice, and then release the button. The heartbeat LED flashes twice. The router boots from the secondary boot image. The boot time is less than one minute.

Reset IP Address

To reset the router and restore the maintenance port IP address to the default (`10.0.0.1`), use a pointed, nonmetallic tool to press and hold the maintenance button until the heartbeat LED flashes six times, and then release the button. The router boots and sets the maintenance port to IP address `10.0.0.1`. The boot time is less than one minute.

The IP address set by this method is not persistent (saved upon reboot). To make the change persistent, use the command line interface (CLI) or Router Manager to set the IP address. For more information, see the *iSR6152 Router Manager User's Guide* or the *iSR6152 Router CLI User's Guide*.

Enable DHCP

To reset the router and configure the maintenance port to use DHCP to acquire its IP address, use a pointed, nonmetallic tool to press and hold the maintenance button until the heartbeat LED flashes seven times, and then release the button. The router boots and configures the maintenance port for DHCP. The boot time is less than one minute.

Enabling DHCP by this method is not persistent; to make the change persistent, use the command line interface (CLI) or Router Manager to enable DHCP. For details, see the *iSR6152 Router Manager User's Guide* or the *iSR6152 Router CLI User's Guide*.

Restore Factory Defaults

To reset the router and restore it to the factory default configuration, use a pointed, nonmetallic tool to press the maintenance button and hold it until the heartbeat LED flashes 20 times, and then release the button. The router boots and is restored to the factory defaults. The boot time is less than one minute.

The router does the following when restored to the factory defaults:

- Resets all passwords.
- Resets the maintenance port IP address to 10.0.0.1.

- Disables the GbE ports and sets the IP address to 0.0.0.0.
- Erases all presentations.
- Erases all discovered initiators and targets.

Fibre Channel Ports

The iSR6152 router has two Fibre Channel ports, labeled **FC1** and **FC2**, as shown in Figure 1-4.

Figure 1-4. Fibre Channel Ports

Each port is served by a small form-factor pluggable (SFP) optical transceiver and is capable of 2Gbps, 4Gbps, or 8Gbps transmission. SFPs are *hot-pluggable*: you can remove or install a transceiver while the router is operating without harming the router or the transceiver. Fibre Channel ports can self-discover both the connection type and transmission speed when connected to public devices or switches.

Fibre Channel Port LEDs

The Fibre Channel port LEDs are located to the right of their respective ports and provide status and activity information. Each port has three LEDs:

- The amber (top) LED shows activity for data passing through the port at 2Gbps speed.
- The green LED (middle) shows activity for data passing through the port at 4Gbps speed.
- The yellow LED (bottom) shows activity for data passing through the port at 8Gbps speed.

Table 1-2 describes the port LED blink patterns and their meanings.

Table 1-2. Port LEDs

Activity	Yellow LED (8Gbps)	Green LED (4Gbps)	Amber LED (2Gbps)
Power OFF	OFF	OFF	OFF
Power ON (before firmware initialization)	ON	ON	ON
Power ON (after firmware initialization)	Flashing	Flashing	Flashing
Firmware initialization error [a]	Alternate flashing	Alternate flashing	Alternate flashing
Online, 2Gbps link—I/O activity	OFF	OFF	ON and flashing
Online, 4Gbps link—I/O activity	OFF	ON and flashing	OFF
Online, 8Gbps link—I/O activity	ON and flashing	OFF	OFF
Beacon	Flashing	OFF	Flashing

[a] Yellow, green, and amber LEDs flash alternatively to indicate firmware initialization errors.

Fibre Channel SFP Transceivers

The iSR6152 router supports SFP optical transceivers for the Fibre Channel ports. A transceiver converts electrical signals to and from optical laser signals to transmit and receive data. Duplex fibre optic cables plug into the transceivers, which then connect to the devices. The Fibre Channel ports are capable of transmitting at 2Gbps, 4Gbps, or 8Gbps; the transceiver must also be capable of delivering these rates.

Although the SFP transceivers are hot-pluggable, this interrupts communication with the connected device. For more information, see “Removing and Replacing SFP Transceivers” on page 5-1.

GbE Port LEDs

The four GbE ports shown in Figure 1-5 are RJ45 connectors that provide connection to an Ethernet SAN through a 100/1000 Base-T Ethernet cable.

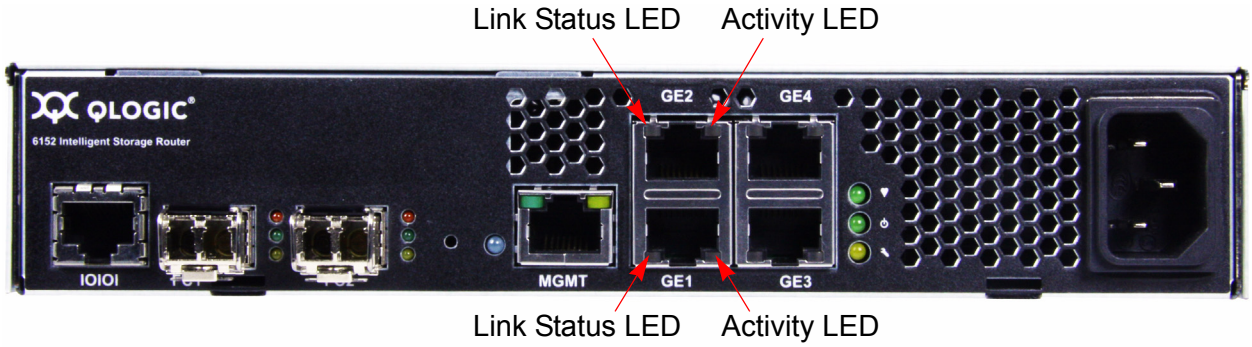


Figure 1-5. GbE Ports

The GbE ports are labeled **GE1**, **GE2**, **GE3**, and **GE4**. Each GbE port has two LEDs:

- The green (left) link status LED lights up to indicate that the link is up.
- The yellow (right) activity LED lights up when the router sends or receives data over the connection.

Ports GE1 and GE3 LEDs are located at the *bottom* left and right corners of each port. Ports GE2 and GE4 LEDs are located at the *top* left and right corners of each port.

Ethernet Management Port

The Ethernet management port shown in Figure 1-6 is an RJ45 connector that provides a connection to a management workstation through a 10/100 Base-T Ethernet cable. The port is labeled **MGMT**.

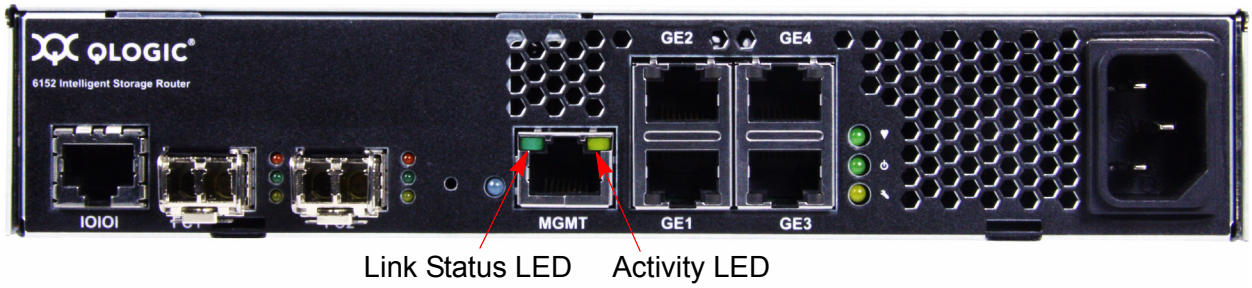


Figure 1-6. Ethernet Management Port

You can use a Windows® or Linux® workstation to configure and manage the router over an Ethernet connection using the Router Manager, CLI, or SNMP (see Appendix A Simple Network Management Protocol (SNMP)).

The management Ethernet port has two LEDs:

- The green (left) link status LED lights up to indicate that the link is up.
- The yellow (right) activity LED lights up when the router sends or receives data over the connection.

Serial Port

The iSR6152 router is equipped with an RS232 serial port for maintenance purposes. Figure 1-7 shows the serial port location. It is labeled **IOIOI**. You can manage the router through the serial port using the CLI.

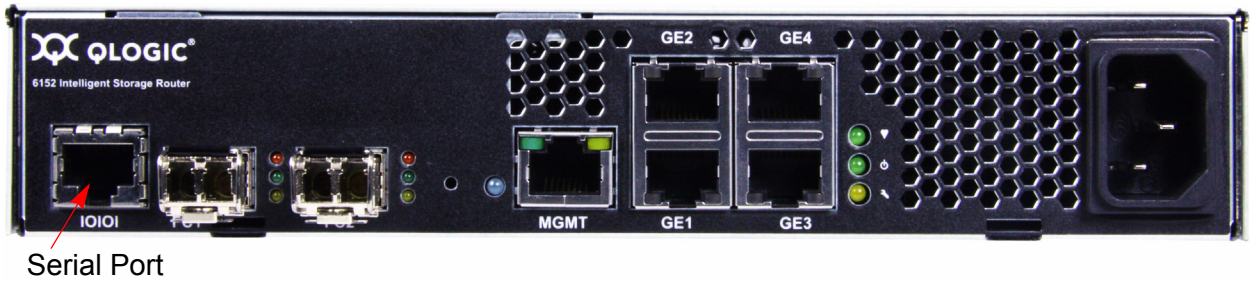


Figure 1-7. Serial Port

The serial port connection requires a standard, eight-wire Ethernet cable and the RJ45-to-DB9F adapter (supplied) to convert the Ethernet RJ45 connector to a female DB9 connector.

2 Planning

This chapter describes how to plan for the iSR6152 router. This includes the following considerations:

- “Devices” on page 2-1
- “Fibre Channel Performance” on page 2-2
- “GbE Performance” on page 2-3
- “Performance Tuning” on page 2-3
- “Fibre Channel Switch Ports and Zoning Requirements” on page 2-7
- “Multiple Routers” on page 2-7
- “Management” on page 2-7
- “Recovery” on page 2-7
- “Services” on page 2-8
- “Security” on page 2-8

Devices

When planning to use the router, consider the number of devices and the anticipated demand. The device quantity determines the required number of ports, and in turn the number of routers.

The router uses small form-factor pluggable (SFP) transceivers in the 2Gbps, 4Gbps, or 8Gbps Fibre Channel ports, but some Fibre Channel devices may not use the same transceivers. Consider whether the Fibre Channel device to be connected to the router uses SFP or gigabit interface converters (GBIC) transceivers, and choose fiber optic cables accordingly. Use LC-type cable connectors for SFP transceivers and SC-type cable connectors for GBIC transceivers. Also consider the transmission speed compatibility of your devices, adapters, switches, and SFPs.

Fibre Channel Performance

The iSR6152 router supports Fibre Channel service at transmission rates of 2Gbps, 4Gbps, or 8Gbps with a maximum frame size of 2,148 bytes. It supports Ethernet service at transmission rates of 1000Mbps or 100Mbps with a maximum transmission unit (MTU) size of 1,500 bytes or 9,000 bytes (jumbo frames).

NOTE:

An MTU size greater than 1,500 should only be used when the router is connected to a 1000Mbps Ethernet network and all links (switches, routers, and so on) that make up the LAN or WAN support greater than 1,500byte frames and are configured for frames greater than 1,500bytes.

Related performance characteristics include the following:

- "Distance" on page 2-2
- "Bandwidth" on page 2-2
- "Latency" on page 2-3

Distance

Consider the physical distance between Fibre Channel devices. Choose SFP transceivers that are compatible with the cable type and distance you need.

Each Fibre Channel port is supported by a data buffer with a three-credit capacity; that is, five maximum-sized frames. For fiber optic cables, this enables full bandwidth over the following approximate distances:

- 2.5km at 2Gbps (1.2 credits/km)
- 1.25km at 4Gbps (2.5 credits/km)
- 0.625km at 8Gbps (5 credits/km)

Transmitting data beyond these distances reduces efficiency because the transmitting port must wait for an acknowledgement before sending the next frame.

Bandwidth

Bandwidth measures the amount of data transmitted over a channel or network. A 2Gbps, 4Gbps, or 8Gbps Fibre Channel port can transmit or receive at nominal rates of 2Gbps, 4Gbps, or 8Gbps, depending on the device to which it is connected. This corresponds to actual bandwidth values of 106MB and 212MB, respectively. WAN data rates range from 1.5Mbps (T1) to greater than 600Mbps (OC-12).

Latency

Latency measures how long a transaction takes to travel through the router or over a communication link.

GbE Performance

The iSR6152 router supports Ethernet service at transmission rates of 1000Mbps or 100Mbps with a MTU size of 1,500 or 9,000 (jumbo frames).

NOTE:

An MTU size greater than 1,500 should only be used when the router is connected to a 1000Mbps Ethernet network and all links (switches, routers, and so on) that make up the LAN/WAN support greater than 1,500byte frames and are configured for frames greater than 1,500bytes.

Consider the physical distance between routers, which is usually measured in round-trip delay. Round-trip delay ranges anywhere from less than 1ms to as great as 250ms.

Performance Tuning

Properly configuring the router maximizes its performance. Knowing the round-trip delay (distance) between routers and the WAN effective data rate (connection type) allows you to tune the routers for optimal performance. The following tables provide **TCP Window Scaling Factor** and **Window Size** settings for specific WAN environments.

NOTE:

For high loss networks, QLogic recommends decreasing the **TCP Window Size** from the initial recommended setting until the network achieves optimal performance.

Table 2-1. T1 / DS-1—1.554 Mbps

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	64K	1
100	32K	0
50	32K	0

Table 2-1. T1 / DS-1—1.554 Mbps (Continued)

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
25	32K	0
20	32K	0
15	32K	0
10	32K	0
5	32K	0
2.5	32K	0
1 or less	32K	0

Table 2-2. T3 / DS-3—45 Mbps

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1MB	5
100	512K	4
50	256K	3
25	128K	2
20	128K	2
15	64–128K	1 or 2
10	64K	1
5	32K	0
2.5	32K	0
1 or less	32K	0

Table 2-3. DS-5—400 Mbps

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1MB	5
100	1MB	5

Table 2-3. DS-5—400 Mbps (Continued)

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
50	1MB	5
25	1MB	5
20	1MB	5
15	1MB	5
10	512K	4
5	256K	3
2.5	128K	2
1 or less	64K	1

Table 2-4. OC-1—50 Mbps

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1MB	5
100	512K	4
50	256K	3
25	128K	2
20	128K	2
15	64–128K	1 or 2
10	64K	1
5	32K	0
2.5	32K	0
1 or less	32K	0

Table 2-5. OC-3—150 Mbps

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1MB	5

Table 2-5. OC-3—150 Mbps (Continued)

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
100	1MB	5
50	1MB	5
25	512K	4
20	512K	4
15	256K	3
10	256K	3
5	128K	2
2.5	64K	1
1 or less	32K	0

Table 2-6. OC-12 and Above—621 Mbps

Round Trip Delay (ms)	Total Window Size (bytes)	Scaling Factor
250	1MB	5
100	1MB	5
50	1MB	5
25	1MB	5
20	1MB	5
15	1MB	5
10	1MB	5
5	512K	4
2.5	256K	3
1 or less	64K	1

Fibre Channel Switch Ports and Zoning Requirements

The iSR6152 Fibre Channel ports are configured either as loop ports or in N_Port ID virtualization (NPIV). Therefore, the Fibre Channel switch port, (where iSR6152 Fibre Channel port is connected) must be configured to support a loop topology such as fibre loop port (FL_Port), generic port (G_Port), or NPIV.

The iSR6152 uses its local Fibre Channel ports for discovering local Fibre Channel devices in the SAN.

QLogic recommends that any Fibre Channel switch connected to the iSR6152 use Fibre Channel world wide port name (WWPN)-based zoning. This requires adding the router's Fibre Channel WWPNs in all local switch zones and the remote router's Fibre Channel WWPNs in all remote switch zones.

Multiple Routers

By connecting multiple routers between your Fibre Channel SANs, you can eliminate any router as a single point of failure.

Management

The Router Manager utility and CLI run on a management workstation that enables you to configure, control, and maintain the router. Support platforms include Windows and Linux.

The router supports the following management interfaces:

- **Router Manager** is a graphical user interface tool that runs on a management workstation (see the *iSR6152 Router Manager User's Guide*).
- **CLI** runs on the router, which you can access using Telnet or the serial port (see the *iSR6152 Router CLI User's Guide*).
- **SNMP** provides router status, traps, and alerts (see Appendix A).

Recovery

It is prudent to have a recovery process in case a router fails. Consider the following when developing a router recovery process:

- Save all firmware image files (updates) in a safe, well-known place, because you may:
  - Want to revert to a previous firmware version.
  - Need the firmware image when replacing a router.
  - Need the firmware image when adding a router to your site.

- Save the router's configuration (as a new file) after every configuration change, because you may:
  - ❑ Want to revert to a previous configuration.
  - ❑ Need to configure a replacement router.
- Save the router's mappings (as a new file) after every mapping change, because you may:
  - ❑ Want to revert to a previous mapping.
  - ❑ Need to map a replacement router.
  - ❑ Want to duplicate the mapping on a second router (for backup).

Services

You can configure the iSR6152 router to suit the demands of your environment using a variety of router services. Familiarize yourself with the following router services and determine which ones you need:

- **Telnet** enables router management over a Telnet connection.
- **Router management** provides for out-of-band router management using Router Manager.
- **SNMP** provides monitoring of the router using third-party applications that use SNMP.
- **Network time protocol (NTP)** enables synchronizing the router and the workstation dates and times with an NTP server. NTP is disabled (and not configured) by default.
- **File transfer protocol (FTP)** enables transferring files rapidly between the workstation and router using FTP.

Security

Passwords provide router security. Router Manager requires a password each time a user logs into the utility. When connected, Router Manager prompts for an administrative password before it accepts configuration changes.

The CLI also requires the user to enter a user ID and password to start. CLI must be in an admin session to perform any set operations. An admin session requires a password.

The default password for both these management tools is “password” for the default user ID of “guest.” The default administrative password is “config.”

After you are logged on, you can change the password using the utility's security features.

3 Installation

This chapter describes how to install and configure an iSR6152 router, and to install the firmware. It contains the following sections:

- Site Requirements
- “Installing the iSR6152 Router” on page 3-2
- “Installing the Firmware” on page 3-11

Site Requirements

The following sections identify the site requirements for installing an iSR6152 router:

- Management Workstation Requirements
- “Power Requirements” on page 3-2
- “Environmental Conditions” on page 3-2

Management Workstation Requirements

The management workstation running Router Manager must meet the requirements listed in Table 3-1.

Table 3-1. Management Workstation Requirements

Item	Description
Operating system	One of the following: ■ Windows® 2003, 2008, and XP ■ Red Hat Enterprise Linux® (RHEL) 3, 4, and 5 ■ SUSE® Enterprise Linux Server (SLES) 9 and 10 ■ Mac OS® X 10.3
Memory	256MB or more
Disk space	150MB per installation
Processor	500MHz or faster
Hardware	CD-ROM drive, RJ45 Ethernet port, RS232 serial port (optional)

Table 3-1. Management Workstation Requirements (Continued)

Item	Description
Internet browser	One of the following: ■ Microsoft Internet Explorer 7.0 and later ■ Safari™ ■ Java 2 runtime environment to support the Web applet

Power Requirements

Power requirements for the iSR6152 router are 0.5Amps at 100–125 VAC, 50Hz to 60Hz or 0.25Amps at 200–240 VAC, 50Hz to 60Hz.

Environmental Conditions

Consider the factors that affect the climate in your facility, such as equipment heat dissipation and ventilation. The router requires the following operating conditions:

- Operating temperature range: 5–40°C (41–104°F)
- Relative humidity: 15–90 percent, non-condensing

Installing the iSR6152 Router

This section provides information about installing, configuring, and connecting the hardware and software, including:

- “Pre-Installation Check List” on page 3-4
- “Mounting the Router” on page 3-4
- “Installing the Transceivers” on page 3-6
- “Connecting the Management Workstation to the Router” on page 3-6
- “Configuring the Management Workstation” on page 3-6
- “Installing Router Manager” on page 3-8
- “Starting Router Manager” on page 3-9
- “Connecting the Router to AC Power” on page 3-10
- “Configuring the Router” on page 3-10
- “Cabling Devices to the Router” on page 3-11

Prior to installing the router, unpack the router and accessories. The iSR6152 router is shipped with the following components, shown in Figure 3-1:

- Power cord.
- Adapter (RJ45 to DB9F) for connecting the router's serial port to a workstation used for configuring and managing the router. A standard Cat5 Ethernet cable is required (not supplied) to connect the adapter to the router. The adapter connects directly to the workstation's serial (COM) port.

Figure 3-1 iSR6152 Router and Accessories

To install the iSR6152 router:

1. Complete the pre-installation checklist (see page 3-4).
2. Mount the router (see page 3-4).
3. Install the transceivers (see page 3-6).
4. Connect the management workstation to the router (see page 3-6).
5. Configure the management workstation (see page 3-6).
6. Install the management utility (see page 3-8).
7. Start the management utility (see page 3-9).
8. Connect the router to AC power (see page 3-10).
9. Configure the router (see page 3-10).
10. Cable Fibre Channel and GbE devices to the router (see page 3-11).

Pre-Installation Check List

During the initial configuration process, the system prompts you for the parameters listed in Table 3-2. Complete this table before installation to expedite the configuration process.

Table 3-2. Pre-Installation Checklist

Item	My System
Symbolic name of iSR6152	
Management Port (**MGMT**)	IP Address (if not using DHCP): Subnet Mask (if not using DHCP): Gateway (if not using DHCP):
GbE Port 1 (**GE1**)	IP Address: Subnet Mask: Gateway:
GbE Port 2 (**GE2**)	IP Address: Subnet Mask: Gateway:
GbE Port 3 (**GE3**)	IP Address: Subnet Mask: Gateway:
GbE Port 4 (**GE4**)	IP Address: Subnet Mask: Gateway:

Mounting the Router

You can place the router on a flat surface or mount it in a standard 19-inch Electronic Industries Association (EIA) rack. See the product specification for weight and dimensions. Rack mounting requires a QLogic rack mounting kit (Part No. ISR614X-RACKKIT). Contact QLogic for more information.

WARNING!!

Mount routers in the rack so that the weight is distributed evenly. An unevenly loaded rack can become unstable, possibly resulting in equipment damage or personal injury.

AVERTISSEMENT!!

Installer les routeurs dans l'armoire informatique de sorte que le poids soit réparti uniformément. Une armoire informatique déséquilibré risque d'entraîner des blessures ou d'endommager l'équipement.

WARNUNG!!

Bauen Sie die Router so in das Rack ein, dass das Gewicht gleichmäßig verteilt ist. Ein Rack mit ungleichmäßiger Gewichtsverteilung kann schwanken/umfallen und Gerätbeschädigung oder Verletzung verursachen.

¡ADVERTENCIA!

Monte los enrutadores en el estante de modo que el peso se distribuya de manera uniforme. Un estante cuya carga no esté distribuida de manera uniforme puede ser inestable y podría dañar el equipo o causar lesiones personales.

CAUTION!

- If the router is mounted in a closed or multi-rack assembly, the operating temperature of the rack environment may be greater than the ambient temperature. Be sure to install the chassis in an environment that is compatible with the maximum rated ambient temperature.
- Do not restrict chassis air flow. Allow 16 cm (6.5 in) minimum clearance at the front and rear of the router (surface mount) or rack for service access and ventilation.
- Multiple rack-mounted units connected to the AC supply circuit may overload that circuit or overload the AC supply wiring. Consider the power source capacity and the total power usage of all routers on the circuit.
- Reliable grounding in the rack must be maintained from the router chassis to the AC power source.

Installing the Transceivers

The router supports a variety of SFP transceivers.

- To install a transceiver, insert the transceiver into the port and gently press until it snaps in place.
- To remove a transceiver, gently press the transceiver into the port to release tension, and then pull the release tab or lever and remove the transceiver. Different transceiver manufactures have different release mechanisms. Consult the documentation of your transceiver.

NOTE:

The transceiver fits only one way. If the transceiver does not install under gentle pressure, flip it over and try again.

Connecting the Management Workstation to the Router

You can manage the router using Router Manager or the CLI. Router Manager requires an Ethernet connection to the router. The CLI can use an Ethernet connection or a serial connection. Choose the router management method, and then connect the management workstation to the router in one of the following ways:

- Indirect Ethernet connection from the management workstation to the router RJ45 connector through an Ethernet switch or hub. This requires a 10/100 Base-T straight-through cable.
- Direct Ethernet connection from the management workstation to the router RJ45 Ethernet connector. This requires a 10/100 Base-T crossover cable.
- Serial port connection from the management workstation to the router RS232 serial port connector. This requires a 10/100 Base-T straight-through cable and an RJ45-to-DB9F adapter (included with the router).

Configuring the Management Workstation

The router comes from the factory with a default IP address (10.0.0.1). Prior to product installation, follow the procedures based on your configuration method:

- If you plan to configure the router through the management Ethernet port (using Router Managerl or CLI using Telnet), you must initially configure the workstation as described in “Setting the Workstation IP Address” on page 3-7.
- If you plan to configure the router using the management COM port, configure the workstation as described in “Configuring the Workstation Serial Port” on page 3-7.

Setting the Workstation IP Address

The IP address of a new router is `10.0.0.1`. To ensure that your workstation is configured to communicate with the `10.0.0` subnet, refer to the following instructions for your workstation:

- Steps for different versions of Windows vary. For a Windows 2000 workstation, follow these steps:
  a. From the Windows **Start** menu, select **Settings>Control Panel>Network and Dial-up Connections**.
  b. Click **Make New Connection**.
  c. Click **Connect to a private network through the Internet**, and then click **Next**.
  d. For the IP address, type **`10.0.0.253`**.
- For other versions of Windows, consult the Windows Help files.
- For a Linux workstation, open a command window and enter the following command, where `<interface>` is your interface name:
  `ifconfig <interface> ipaddress 10.0.0.253 netmask 255.255.255.0 up`

Configuring the Workstation Serial Port

To configure the workstation serial port:

1. Connect the cable with RJ45-to-DB9F adapter from a COM port on the management workstation to the serial port on the router.
2. Configure the workstation serial port according to your platform. These steps may vary according to the version of operating system you use:
   - ❑ For Windows:
     a. Open the HyperTerminal application. From the Windows **Start** menu, select **Programs>Accessories>HyperTerminal>HyperTerminal**.
     b. Enter a name for the router connection, choose an icon in the Connection Description window, and then click **OK**.
     c. Enter the following COM Port settings in the COM Properties window and click **OK**.

     Bits per second—115200
     Data Bits—8
     Parity—None
     Stop Bits—1
     Flow Control—None

- ❑ For Linux:

  a. Set up minicom to use the serial port. Create or modify the `/etc/minirc.dfl` file with the following content:

  ```
  pr portdev/ttyS0
  pu minit
  pu mreset
  pu mhangup
  pr portdev/ttyS0 specifies port 0 on the workstation.
  Choose the pr setting to match the workstation port
  to which you connected the router.
  ```

  b. Verify that all users have permission to run minicom. Review the `/etc/minicom.users` file and confirm that the line ALL exists or that there are specific user entries.

3. Connect the router to the power (see page 3-10).

Installing Router Manager

You can manage the router using the Router Manager utility. The following sections describe how to install the utility on either a Windows or Linux workstation. See the *iSR6152 Router Manager User's Guide* for information on how to use the Router Manager.

Windows Installation

Perform the following steps to install Router Manager from the QLogic Web site to a PC workstation.

To install Router Manager on Windows

1. Close all currently running programs.
2. Go to the QLogic Driver Downloads/Documentation page:

   http://driverdownloads.qlogic.com

3. Under **Downloads**, click **QLogic Products**.
4. Under **QLogic Products**, click the **Routers** link.
5. In the product selection window, click the **iSR6152** model number, and then then click **Go**.
6. On the iSR6152 Downloads page under **Management Tools**, click the link to the Router Manager for your operating system.
7. On the End User Software License Agreement page, read the license agreement, and then click **I Agree** to continue.
8. Save the installation file to your local machine.
9. Run the Router Manager installer by following the system prompts.

Linux Installation

Perform the following steps to install Router Manager from the QLogic Web site to a Linux workstation.

To install Router Manager on Linux

1. Go to the QLogic Driver Downloads/Documentation page:

   http://driverdownloads.qlogic.com

2. Under **Downloads**, click **QLogic Products**.
3. Under **QLogic Products**, click the **Routers** link.
4. In the product selection window, click the **iSR6152** model number, and then then click **Go**.
5. On the iSR6152 Downloads page under **Management Tools**, click the link to the Router Manager for your operating system.
6. On the End User Software License Agreement page, read the license agreement, and then click **I Agree** to continue.
7. Save the installation file to your local machine.
8. Uncompress the downloaded file, and then execute the `Linux_x.xx.bin` install program.
9. Follow the installation instructions.

Starting Router Manager

For Windows, double-click the Router Manager shortcut, or select **Router Manager** from the **Start** menu, depending on how you installed the utility.

Or, from a command line, enter the command for your operating system:

- On Windows, enter the following command:

  *<install_directory>***SANsurfer_Router_Manager.exe**

- On Linux, enter the following command:

  *<install_directory>***./SANsurfer_Router_Manager**

Connecting the Router to AC Power

WARNING!!

This product is supplied with a three-wire power cable and plug for the user's safety. To avoid electrical shock, use this power cable in conjunction with a properly grounded outlet. An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the router chassis. It is the customer's responsibility to ensure that the outlet is correctly wired and grounded to prevent electrical shock.

You may require a different power cable in some countries because the plug on the cable supplied with the equipment will not fit your electrical outlet. In this case, you must supply your own power cable. The cable must meet the following requirements:

- **For 125Volt electrical service:** The cable must be rated at 10 Amps and be approved by UL and CSA.
- **For 250Volt electrical service:** The cable must be rated at 10 Amps, meet requirements of H05VV-F, and be approved by VDE, SEMKO, and DEMKO.

To power up the router, connect the power cord to the power receptacle on the router chassis and to a grounded AC outlet. The router responds in the following sequence:

1. The chassis LEDs (input power, heartbeat, system fault) light up, and then all port LEDs light up.
2. After a couple of seconds the heartbeat and system fault LEDs go off, while the input power LED stays on. The router is executing the POST.
3. The POST completes after about 45 seconds and the heartbeat LED starts flashing at a one second rate. If an error has occurred, the System Fault LED blinks a pattern that indicates the fault reason. For more information see "System Error Blink Pattern" on page 4-3.

Configuring the Router

You can configure the router using the CLI.

To configure the router using the command line interface:

1. Open a command window according to the type of workstation and connection:

   - **Ethernet (all platforms).** Open a Telnet session with the default router IP address and log into the router with the default account name and password (guest/password) as follows.

     ```
     telnet 10.0.0.1
     user name – guest
     password – ********
     ```

   - **Serial.** On Windows, open the HyperTerminal application. The next steps may vary according to the version of Windows you use:

     a. On the Windows **Start** menu, point to **Programs**, **Accessories**, **HyperTerminal**, and then click **HyperTerminal**.

     b. Select the connection you created earlier, and then click **OK**.

   - **Serial.** On Linux, open a command window and issue the following command:

     ```
     minicom
     ```

2. Open an Admin session and issue the `set mgmt` command to set up the management interface. See the *iSR6152 Router CLI User's Guide* for command descriptions.

   ```
   QRouter #> admin start
   Password  –  ******
   QRouter (admin) #> set mgmt
   ```

Cabling Devices to the Router

Connect cables to the SFP transceivers and their corresponding devices. Devices can have either SFP or gigabit interface converters (GBIC). Lucent (LC)-type duplex fiber optic cable connectors are designed for SFP transceivers, while subscriber-connector (SC)-type connectors are designed for GBICs. Choose the fiber optic cable with the connector combination that matches the device you are connecting to the router.

Installing the Firmware

The router comes installed with the current firmware. As new firmware becomes available, you can upgrade the firmware from the management workstation. You can use Router Manager or the CLI to install new firmware.

WARNING!!

Installing new firmware disrupts the router connectivity because you must reboot the router to activate the new firmware. The reboot may result in the transfer of incorrect data between devices connected to the router. QLogic recommends that you suspend activity on the interfaces before activating the new firmware.

Using Router Manager to Install Firmware

To install firmware using Router Manager:

1. In the topology view, double-click the router.
2. In the Firmware Upload window, click **Select** to browse for and select the firmware file you want to upload.
3. To begin the firmware load process, click **Start**.

   A message box warns that the router will be reset to activate the firmware.
4. To continue firmware installation, click **OK**, or click **Cancel** to terminate the firmware installation.

Using the CLI to Install Firmware

To use the CLI to install the firmware, transfer the firmware image file from a workstation to the router. Then use the CLI `image unpack` command to install the new firmware image.

To install firmware using the CLI:

1. At the workstation prompt, enter the `ftp` command to go to the location on the router where you want to transfer the firmware image. For example:

```
C:\fwImage>ftp 172.17.137.190
Connected to 172.17.137.190.
220 (none) FTP server (GNU inetutils 1.4.2) ready.
```

2. Enter your user name and password. For example:

```
User (172.17.137.190:(none)) – ftp
331 Guest login ok, type your name as password.
Password – ftp
230 Guest login ok, access restrictions apply.
```

3. At the `ftp` prompt, type `BIN` to set binary mode. For example:

```
ftp> bin
200 Type set to I.
```

4. Use the `put` command to transfer the firmware image file from the workstation to the router. For example:

```
ftp> put isr-6152-3_3_0_x.bin
200 PORT command successful.
150 Opening BINARY mode data connection for
'isr-6152-3_3_0_x.bin'.
226 Transfer complete.
ftp - 4822816 bytes sent in 0.41Seconds 11878.86Kbytes/sec.
```

5. Type **`quit`**.

   The firmware image has been transferred to the router.

6. Log on to the router as an `administrator`. For example:

```
iSR6152 login: guest
Password: ********

Welcome to iSR6152

       ******************************************************
       *                                                    *
       *                       iSR6152                      *
       *                                                    *
       ******************************************************

iSR6152 #> admin start

  Password     :  ******

iSR6152 (admin) #>
```

7. Type the following command from the router, where *x* stands for the firmware image name:

   `image unpack isr-6152-3_3_0_x.bin`

   The following message appears:

```
Unpack Completed. Please reboot the system for FW to take
affect.
```

8. Type **`reboot`**.

   The following message appears:

```
Are you sure you want to reboot the System (y/n):
```

9. To reboot the system, type **`y`**.

4 Diagnostics and Troubleshooting

Diagnostic information about the router is available through the chassis LEDs and the port LEDs. Diagnostic information is also available through the Router Manager and CLI event logs and error messages. This chapter provides the following diagnostic and maintenance information:

- Chassis Diagnostics
- “Power-On Self-Test Diagnostics” on page 4-2
- “LED Blink Patterns” on page 4-2
- “Recovering a Router” on page 4-4

Chassis Diagnostics

The chassis LEDs show chassis diagnostics as shown in Figure 4-1.

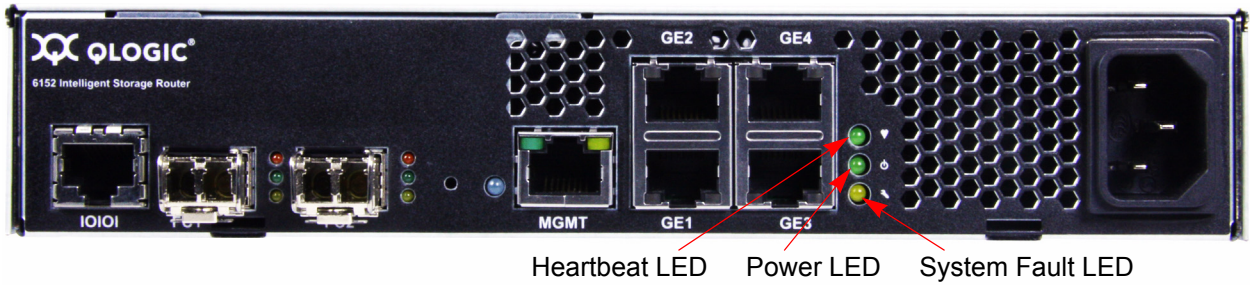


Figure 4-1. Chassis Diagnostic LEDs

This section describes the following conditions:

- “Input Power LED is Off” on page 4-2
- “System Fault LED is On” on page 4-2

Input Power LED is Off

The input power LED lights up to show that the router logic circuitry is receiving proper voltages. If the input power LED is off, follow these steps:

1. Inspect power cord and connectors. Is the cord unplugged? Is the cord or connector damaged?
   - ❑ **Yes**—Make necessary corrections or repairs. If the condition remains, continue with Step 2.
   - ❑ **No**—Continue with Step 2.
2. Inspect AC power source. Is the power source delivering the proper voltage?
   - ❑ **Yes**—Continue with Step 3.
   - ❑ **No**—Make the necessary repairs. If the condition remains, continue with Step 3.
3. Replace the router.

System Fault LED is On

The system fault LED blinks a specific pattern to indicate the problem. If the system fault LED lights up, take necessary actions (see “LED Blink Patterns” on page 4-2).

Power-On Self-Test Diagnostics

The router performs a series of tests as part of its power-on procedure. The POST diagnostic program performs the following tests:

- Memory
- Flash validation
- PCI device discovery
- Management Ethernet port

LED Blink Patterns

The heartbeat and system fault LEDs show the operational status of the router. When the POST completes with no errors, the heartbeat LED blinks once every second. When the router is in maintenance mode, the heartbeat and system fault LEDs are on continuously.

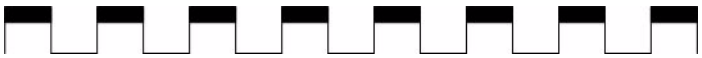
All other system fault blink patterns show critical errors. The heartbeat LED shows an error blink pattern for the conditions listed in Table 4-1.

Table 4-1. System Fault LED Blink Patterns

System Fault LED	Condition
OFF	OK - Operational
3 Blinks, followed by pause	System error
4 Blinks, followed by pause	Management port IP address conflict
5 Blinks, followed by pause	Over temperature

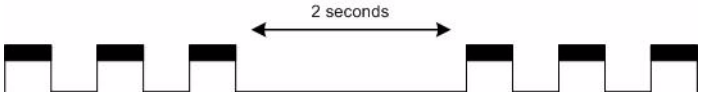
Heartbeat Blink Pattern

A blink pattern on the heartbeat LED of one second ON followed by one second OFF means that the router is operating normally. The heartbeat LED shows this pattern when the router firmware is operational:



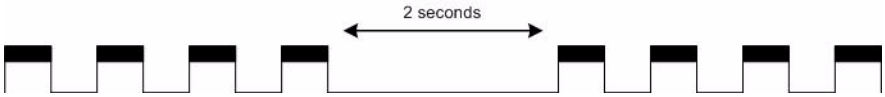
System Error Blink Pattern

The system fault LED generates a three-blink pattern (once per second) followed by a two second pause to indicate a system error:



Management Port IP Address Conflict Blink Pattern

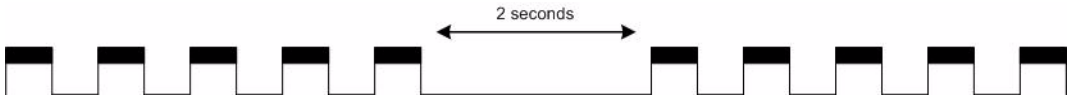
The system fault LED generates a four-blink pattern (once per second) followed by a two second pause when the router detects an IP address conflict on the management Ethernet port:



You can clear the IP address conflict blinking using the CLI or the Router Manager. Use the beacon OFF function.

Over-Temperature Blink Pattern

The system fault LED generates a five-blink pattern (once per second) followed by a two-second pause when the router is in an over-temperature condition. For example, this occurs when the air temperature inside the router is over the failure temperature of 70°C (158°F).



If the system alert LED shows the over-temperature blink pattern, follow these steps:

1. Inspect the chassis air vents. Are the intake and exhaust vents clear?
   - ❑ **Yes**—Continue with Step 2.
   - ❑ **No**—Remove any debris from the fan intake and exhaust if necessary. If the condition remains, continue with Step 2.
2. Consider the ambient air temperature near the router and clearance around the router. Make necessary corrections. If the condition remains:
   a. Open a command line window and log on to the router.
   b. Enter the `shutdown` command.
   c. Power down the router.
   d. Contact your authorized maintenance provider.

Recovering a Router

You may have to recover a router for one of the following reasons:

- The password was changed and has been forgotten.
- The router's management IP address is unknown.

To recover the router's password, reset the password to the default by using the maintenance button (see "Maintenance Button" on page 1-4).

You can recover the router's IP address using either of the following methods:

- Connect to the serial console port (see"Serial Port" on page 1-9), and then use the `CLI set mgmt` command reconfigure the management port (see the *iSR6152 Router CLI User's Guide*).
- Use the maintenance button to reset the management port's IP to the factory default of `10.0.0.1` (see "Maintenance Button" on page 1-4).

5 Removal and Replacement

This chapter provides removal and replacement procedures for the following field replaceable units (FRUs):

- SFP transceivers
- iSR6152 router

Removing and Replacing SFP Transceivers

You can remove and replace the SFP transceivers while the router is operating without damaging the router or the transceiver. However, doing so interrupts transmission on the affected port until the transceiver is installed.

- **To remove a transceiver**, gently press the transceiver into the port to release the tension, and then pull the release tab or lever and remove the transceiver. Different transceiver manufactures have different release mechanisms. Consult the documentation for your transceiver.
- **To install a transceiver**, insert the transceiver into the port and gently press until it snaps in place.

NOTE:

The SFP transceiver fits only one way. If the SFP does not install under gentle pressure, flip it over and try again.

Removing and Replacing the Router

Before you can remove and replace the router, you must turn off the power to the router and disconnect its power cable. The router loses all the Fibre Channel and Ethernet connections.

Removing the Router

Perform the following steps, as applicable, to remove a router.

To remove a router:

1. Make sure all traffic (I/O operations to the router) subsides at the initiator systems.
2. Save the configuration data of the router using the CLI FRU command (see the *iSR6152 Router CLI User's Guide*).
3. Power down the router.
4. Disconnect the power cable.
5. Label all the cables so you can connect them to the same ports on the replacement router.
6. Remove all the Fibre Channel and Ethernet cables.
7. Remove the router from the enclosure where it is mounted.

Replacing the Router

Before replacing a router, you must first remove the previously installed router (as described in the preceding).

To install a replacement router:

1. Mount the router in the enclosure.
2. Reconnect the Fibre Channel and Ethernet cables to the ports where they were previously connected.
3. Connect the power cable to the router.
4. Using a management station, configure the management port IP address (see “Configuring the Management Workstation” on page 3-6).
5. Using a management workstation, restore the saved configuration or reconfigure the router as needed (see the *iSR6152 Router CLI User's Guide*).

The replacement router should now be operational.

A Simple Network Management Protocol (SNMP)

SNMP provides monitoring and trap functions for managing the router through third-party applications that support SNMP. The router firmware supports SNMP versions 1 and 2 and a QLogic (see page A-2). You may format the traps using SNMP version 1 or 2 (see page A-10).

SNMP Properties

You can set the SNMP properties using either the command line interface (CLI) (see the *iSR6152 Router CLI Users Guide*) or Router Manager (see the *iSR6152 Router Manager Users Guide*).

Table A-1 lists the SNMP properties.

Table A-1. SNMP Properties

Parameter	Description
Read community	A password that authorizes an SNMP management server to read information from the router. This is a write-only field. The value on the router and the SNMP management server must be the same. The read community password can be up to 32 characters *excluding* the number sign (#), semicolon (;), and comma (,). The default is password is *public*.
Trap community	A password that authorizes an SNMP management server to receive traps. This is a write-only field. The value on the router and the SNMP management server must be the same. The trap community password can be up to 32 characters *excluding* the number sign (#), semicolon (;), and comma (,). The default password is *public*.
System location	Name of the router location. The name can be up to 64 characters *excluding* the number sign (#), semicolon (;), and comma (,). The default is undefined.

Table A-1. SNMP Properties (Continued)

Parameter	Description
System contact	Name of the person to be contacted to respond to trap events. The name can be up to 64 characters excluding the number sign (#), semicolon (;), and comma (,). The default is undefined.
Authentication traps	Enables or disables authentication trap generation in response to authentication failures. The default is disabled.

SNMP Trap Configuration

SNMP trap configuration supports setting up to eight trap destinations. Choose from Traps 1–Trap 8 to configure each trap. Table A-2 describes the parameters for configuring a SNMP trap.

Table A-2. SNMP Trap Configuration Parameters

Parameter	Description
Trap *n* enabled	Enables or disables trap *n*. If disabled, the trap is not configured.
Trap address*	IP address to which the SNMP traps are sent. A maximum of eight trap addresses are supported. The default address for traps is 0.0.0.0.
Trap port*	Port number on which the trap is sent. The default is 162.
Trap version	SNMP version (1 or 2) with which to format traps.

Table Notes

*Trap address (other than 0.0.0.) and trap port combinations must be unique. For example, if trap 1 and trap 2 have the same address, and then they must have different port values. Similarly, if trap 1 and trap 2 have the same port value, they must have different addresses.

Management Information Base (MIB)

The following sections describe the QLogic management information base (MIB). The MIB consists of four object groups:

- System Information
- Network Port Table
- Fibre Channel Port Table
- Sensor Table

System Information

The system information objects provide the system serial number, version numbers (hardware/software/agent), and number of ports (FC/GE).

qsrSerialNumber

Syntax: SnmpAdminString
Access: Read only
Description: System serial number.

qsrHwVersion

Syntax: SnmpAdminString
Access: Read only
Description: System hardware version number.

qsrSwVersion

Syntax: SnmpAdminString
Access: Read only
Description: System software (firmware) version number.

qsrNoOfFcPorts

Syntax: Unsigned32
Access: Read only
Description: Number of Fibre Channel ports on the system.

qsrNoOfGbEPorts

Syntax: Unsigned32
Access: Read only
Description: Number of GbE ports on the system.

qsrAgentVersion

Syntax: SnmpAdminString
Access: Read only
Description: Version number of the agent software on the system.

Network Port Table

The network port table contains a list of network ports that are operational on the router. The entries in this table include the management port and the GbE ports on the router.

qsrNwPortTable

Syntax: **Sequence of** QsrNwPortEntry

Access: Not accessible

Description: Entries in this table include the management port and the GbE ports on the router.

qsrNwPortEntry

Syntax: QsrNwPortEntry

Access: Not accessible

Description: Each entry (row) contains information about a specific network port.

QsrNwPortEntry

A network port entry consists of the following sequence of objects:

qsrNwPortRole	QsrPortRole
qsrNwPortIndex	unsigned32
qsrNwPortAddressMode	INTEGER
qsrIPAddressType	InetAddressType
qsrIPAddress	InetAddress
qsrNetMask	InetAddress
qsrGateway	InetAddress
qsrMacAddress	MacAddress
qsrNwLinkStatus	QsrLinkStatus
qsrNwLinkRate	QsrLinkRate

qsrNwPortRole

Syntax: QsrPortRole

Access: Not accessible

Description: Operational role of this port: management port or GbE port.

qsrNwPortIndex

Syntax: Unsigned32

Access: Not accessible

Description: A positive integer indexing each network port in a specific role.

qsrNwPortAddressMode

Syntax: INTEGER
1 = Static
2 = DHCP
3 = Bootp
4 = RARP
Access: Read only
Description: Method by which the port gets its IP address.

qsrIPAddressType

Syntax: InetAddressType
Access: Read only
Description: IP address type: ipv4 or ipv6.

qsrIPAddress

Syntax: InetAddress
Access: Read only
Description: IP address of the port.

qsrNetMask

Syntax: InetAddress
Access: Read only
Description: Subnet mask for this port.

qsrGateway

Syntax: InetAddress
Access: Read only
Description: Gateway for this port.

qsrMacAddress

Syntax: IMacAddress
Access: Read only
Description: MAC address for this port.

qstNwLinkStatus

Syntax: QsrLinkStatus
Access: Read only
Description: Operational link status for this port.

qsrNwLinkRate

Syntax: QsrLinkRate
Access: Read only
Description: Operational link rate for this port.

Fibre Channel Port Table

This table contains a list of the Fibre Channel ports on the router.There are as many entries in this table as there are Fibre Channel ports on the router.

qsrFcPortTable

Syntax: **Sequence of** QsrFcPortEntry
Access: Not accessible
Description: List of the Fibre Channel ports on the router.There are as many entries in this table as there are Fibre Channel ports on the router.

qsrFcPortEntry

Syntax: QsrFcPortEntry
Access: Not accessible
Description: Each entry (row) contains information about a specific Fibre Channel port.

QsrFcPortEntry

A Fibre Channel port entry consists of the following sequence of objects:

qsrFcPortRole	QsrPortRole
qsrFcPortIndex	Unsigned32
qsrFcPortNodeWwn	PhysAddress
qsrFcPortWwn	PhysAddress
qsrFcPortId	PhysAddress
qsrFcPortType	Unsigned32
qsrFcLinkStatus	QsrLinkStatus
qsrFcLinkRate	QsrLinkRate

qsrFcPortRole

Syntax: QsrPortRole
Access: Not accessible
Description: Operational role of this port: FCP mode or frame shuttle mode.

qsrFcPortIndex

Syntax: Unsigned32

Access: Not accessible

Description: A positive integer indexing each Fibre Channel port in a specified role.

qsrFcPortNodeWwn

Syntax: PhysAddress

Access: Read only

Description: World wide name of the node that contains this port.

qsrFcPortWwn

Syntax: PhysAddress

Access: Read only

Description: World wide name for this port.

qsrFcPortId

Syntax: PhysAddress

Access: Read only

Description: Interface's 24-bit Fibre Channel address identifier.

qsrFcPortType

Syntax: Unsigned32

Access: Read only

Description: Type of Fibre Channel port, as indicated by the use of the appropriate value assigned by IANA. The IANA-maintained registry for Fibre Channel port types can be found at:

www.iana.org/assignments/fc-port-types

qsrFcLinkStatus

Syntax: QsrLinkStatus

Access: Read only

Description: Current link status for this port.

qsrFcLinkRate

Syntax: QsrLinkRate
Access: Read only
Description: Current link rate for this port.

Sensor Table

This table contains a list of all the sensors on the router. There are as many entries (rows) in this table as there are sensors.

qsrSensorTable

Syntax: **Sequence of** QsrSensorEntry
Access: Not accessible
Description: List of all the sensors on the router. There are as many entries (rows) in this table as there are sensors.

qsrSensorEntry

Syntax: QsrSensorEntry
Access: Not accessible
Description: Each entry (row) corresponds to a single sensor.

QsrSensorEntry

A sensor entry consists of the following sequence of objects:

qsrSensorType	INTEGER
qsrSensorIndex	Unsigned32
qsrSensorUnits	INTEGER
qsrSensorValue	Integer32
qsrUpperThreshold	Integer32
qsrLowerThreshold	Integer32
qsrSensorState	INTEGER

qsrSensorType

Syntax: INTEGER
Temperature = 1
Access: Not accessible
Description: Type of data being measured by this sensor.

qsrSensorIndex

Syntax: Unsigned32
Access: Not accessible
Description: A positive integer identifying each sensor of a specific type.

qsrSensorUnits

Syntax: INTEGER
Celsius = 1
Access: Read only
Description: Unit of measurement for the sensor.

qsrSensorValue

Syntax: Integer32
Access: Read only
Description: Current value of the sensor.

qsrUpperThreshold

Syntax: Integer32
Access: Read only
Description: Upper-level threshold for this sensor.

qsrLowerThreshold

Syntax: Integer32
Access: Read only
Description: Lower-level threshold for this sensor.

qsrSensorState

Syntax: INTEGER

Access: Read only

Description: The state of this sensor, indicating the health of the system.

Unknown—Sensor value/thresholds cannot be determined.

Normal—Sensor value is within normal operational limits.

Warning—Sensor value is approaching a threshold.

Critical—Sensor value has crossed a threshold.

Notifications

This section describes the following router notification types and objects they use:

- Notification Objects
- Agent Start Up Notification
- Agent Shut Down Notification
- Network Port Down Notification
- Fibre Channel Port Down Notification
- Sensor Notification
- Generic Notification

Notification Objects

This section defines the objects used in notifications.

qsrEventSeverity

Syntax: INTEGER

Access: Accessible for notify

Description: This notification indicates the severity of the event. The value *clear* specifies that a condition that caused an earlier trap is no longer present.

qsrEventDescription

Syntax: SnmpAdminString

Access: Accessible for notify

Description: A textual description of the event that occurred.

qsrEventTimeStamp

Syntax: DateAndTime

Access: Accessible for notify

Description: This notification indicates when the event occurred.

Agent Start Up Notification

The agent startup notification indicates that the agent on the router has started running.

qsrAgentStartup uses the following object:

- qsrEventTimeStamp

Agent Shut Down Notification

The agent shut down notification indicates that the agent on the router is shutting down.

qsrAgentShutdown uses the following object:

- qsrEventTimeStamp

Network Port Down Notification

The network port down notification indicates that the specified network port is *down*. The next time the port comes up, this event is sent with the *qsrEventSeverity* object set to *clear*.

qsrNwPortDown uses the following objects:

- qsrNwLinkStatus
- qsrEventTimeStamp
- qsrEventSeverity

Fibre Channel Port Down Notification

The Fibre Channel port down notification indicates that the specified Fibre Channel port is *down*. The next time the port comes up, this event is sent with the *qsrEventSeverity* object set to *clear*.

qsrFcPortDown uses the following objects:

- qsrFcLinkStatus
- qsrEventTimeStamp
- qsrEventSeverity

Sensor Notification

The sensor notification indicates that the state for the specified sensor is not *normal*. When the sensor returns to the normal state, this event is sent with the *qsrEventSeverity* object set to *clear*.

qsrSensorNotification uses the following objects:

- qsrSensorValue
- qsrSensorState
- qsrEventTimeStamp
- qsrEventSeverity

Generic Notification

The generic notification reports events other than the defined event types. It provides a description object that identifies the event in clear text.

qsrGenericEvent uses the following objects:

- qsrEventTimeStamp
- qsrEventSeverity
- qsrEventDescription

B Log Messages

This appendix provides reference material on messages logged to a file. You can retrieve these message logs using either the CLI (see the *iSR6152 Router CLI User's Guide)* or Router Manager (see the *iSR6152 Router Manager User's Guide*).

The message log is persistent, maintained across router power cycles and reboots. Log message categories include the following:

- "Informational Log Messages" on page B-1
- "Error Log Messages" on page B-9
- "Fatal Log Messages" on page B-24

Informational Log Messages

The following sections list and describe the informational log messages by reporting module:

- "Application Modules" on page B-2
- "iSCSI Driver" on page B-4
- "Fibre Channel Driver" on page B-4
- "User Modules" on page B-6
- "FCIP Module" on page B-8
- "TOE Driver" on page B-9
- "System Modules" on page B-9

Application Modules

Table B-1 lists informational log messages generated by the application modules.

Table B-1. Application Modules—Informational Log Messages

ID	Log Message	No.	Description
53254	`System (router) Booting up`	6	Router is booting up.
53357	`QLBA_ProcessTpb: De-compression failed. Disabling compression temporarily`	109	De-compression failed and is temporarily disabled.
54274	`QLFC_Login: Origin 0x%x, VP Index 0x%x, Id 0x%x`	1026	Fibre Channel login occurred, origin xx (1 = HBA, 2 = target, 3 = initiator), VP (virtual port) xx, ID (loop ID) xx.
54275	`QLFC_Login: Port ID  %.2x%.2x%.2x`	1027	Fibre Channel login occurred with port ID xx.xx.xx.
54276	`QLFC_Login: Node Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x`	1028	Fibre Channel login occurred with WWNN xx.xx.xx.xx.xx.xx.xx.xx.
54277	`QLFC_Login: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x`	1029	Fibre Channel login occurred with WWPN xx.xx.xx.xx.xx.xx.xx.xx.
54306	`QLFC_Logout: Origin 0x%x, VP Index 0x%x, Id 0x%x`	1058	Fibre Channel logout occurred, origin xx (1 = HBA, 2 = target, 3 = initiator), VP (virtual port) xx, ID (loop ID) x.
54307	`QLFC_Logout: Port ID  %.2x%.2x%.2x`	1059	Fibre Channel logout occurred with port ID xx.xx.xx.
54308	`QLFC_Logout: Node Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x`	1060	Fibre Channel logout occurred with WWNN xx.xx.xx.xx.xx.xx.xx.xx.
54309	`QLFC_Logout: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x`	1061	Fibre Channel logout occurred with WWPN xx.xx.xx.xx.xx.xx.xx.xx.

Table B-1. Application Modules—Informational Log Messages (Continued)

ID	Log Message	No.	Description
54359	QLFC_HandleTeb: FC Login. VP 0x%x	1111	Fibre Channel login event notification, VP (virtual port) xx.
54368	QLFC_CreateVirtualInitiatorObject: Maximum host (%d) limit reached.	1120	Maximum number of support hosts dd has been reached.
54938	QLIS_HandleTeb: UTM_EC_OPEN_CONNECTION	1690	Event notification: iSCSI open connection request.
54939	QLIS_HandleTeb: UTM_EC_CLOSE_CONNECTION or UTM_EC_CONNECTION_CLOSED	1691	Event notification: iSCSI close connection request or connection closed.
54940	QLIS_HandleTeb: UTM_EC_CONNECTION_OPENED	1692	Event notification: iSCSI connection opened.
54941	QLIS_HandleTeb:iSNS Server Open Connection succeeded	1693	Event notification: connection opened with iSNS server.
54943	QLIS_HandleTeb: UTM_EC_ISNS_SCN	1695	Event notification: iSNS SCN received.
54945	QLIS_HandleTeb: UTM_EC_ISNS_CLIENT_DISCOVERED	1697	Event notification: iSNS client discovered.
54947	QLIS_HandleTeb: UTM_EC_CLOSE_CONNECTION	1699	iSCSI close connection request received.
54948	QLIS_HandleTeb: UTM_EC_CONNECTION_CLOSED	1700	iSCSI connection closed.
54963	QLIS_SetDdbEntryContinue:[%d:%d] Remote system connection established	1715	Remote system connection established using DDB d:d.
54986	QLIS_HandleSessionTimer: Re-enabling compression	1738	Re-enabling compression.
55299	QLSC_CollectBUVUIO: Freeing dead TRB: State 0x%02X, AbortReason %d, Flags 0x%02X	2051	TRB freed, State xx, Abort Reason d, Flags xx.

iSCSI Driver

Table B-2 lists the informational log messages that are common to all iSCSI ports: 1 (GE1), 2 (GE2), 3 (GE3), and 4 (GE4). Log messages beginning with #0 denote iSCSI port 1 (GE1), #1 denotes iSCSI port 2 (GE2), #2 denotes iSCSI port 3 (GE3), and #3 denotes iSCSI 4 (GE4).

Table B-2. iSCSI Driver—Informational Log Messages

ID	Log Message	No.	Description
86343	`#%d: QLPortUp: Set link configuration 0x%x`	327	iSCSI port enabled, port up.
86347	`#%d: QLDisable: Restart RISC`	331	Restart iSCSI processor (RISC).
86349	`#%d: QLEnable: Restart RISC to update EEPROM`	333	EEPROM updated, restart iSCSI processor (RISC).
86352	`#%d: QLPortDown: Set link configuration 0x%x`	336	iSCSI port disabled, port down.
86874	`#%d: QLIsrDecodeMailbox: Link up`	858	Link up reported by iSCSI processor for GE1 or GE 2.

Fibre Channel Driver

Table B-3 lists the informational log messages that are common to both Fibre Channel ports: 1 (FC1) and 2 (FC2). Log messages beginning with #0 denote Fibre Channel port 1 (FC1) and log messages beginning with #1 denote Fibre Channel port 2 (FC2).

Table B-3. Fibre Channel Driver—Informational Log Messages

ID	Log Message	No.	Description
118882	`#%d: QLIoctlDisable: Reset adapter`	98	Request to reset the Fibre Channel processor (adapter) received from IOCTL interface.

Table B-3. Fibre Channel Driver—Informational Log Messages (Continued)

ID	Log Message	No.	Description
119088	`#%d: QLIsrEventHandler: LIP occurred (%x): mailbox1 = %x`	304	Fibre Channel loop initialization procedure (LIP) occurred. The LIP type is reported, as is the contents of the Fibre Channel processor's mailbox 1 register.
119089	`#%d: QLIsrEventHandler: LIP reset occurred (%x): mailbox1 = %x`	305	Fibre Channel LIP reset occurred. The LIP reset type is reported, as is the contents of the Fibre Channel processor's mailbox 1 register.
119090	`#%d: QLIsrEventHandler: Link up (%x) mailbox1 = %x`	306	Fibre Channel link up occurred. Event status is reported, as is the contents of the Fibre Channel processor's mailbox 1 register.
119092	`#%d: QLIsrEventHandler: Link mode up (%x): RunTimeMode=%x`	308	Fibre Channel link up occurred. Event status is reported, as is the RunTimeMode (0 = loop, 1 = point-to-point).
119093	`#%d: QLIsrEventHandler: RSCN update (%x) rscnInfo: %x`	309	A RSCN was received. Event status is reported, as is the RSCN information.
119097	`#%d: QLIsrEventHandler: Port update (%x) mb1-3 %x %x %x`	313	Request to reset the Fibre Channel processor (adapter) received from IOCTL interface.
119552	`#%d: QLFcipIsrEventHandler: Link up (%x) mailbox1 = %x`	768	Fibre Channel loop initialization procedure (LIP) occurred. The LIP type is reported, as is the contents of the Fibre Channel processor's mailbox 1 register.
119553	`#%d: QLFcipIsrEventHandler: Link down (%x)`	769	Fibre Channel LIP reset occurred. The LIP reset type is reported, as is the contents of the Fibre Channel processor's mailbox 1 register.
119554	`#%d: QLFcipIsrEventHandler: Link mode up (%x)`	770	Fibre Channel link up occurred. Event status is reported, as is the contents of the Fibre Channel processor's mailbox 1 register.

User Modules

Table B-4 lists the log messages generated by the user modules.

Table B-4. User Modules—Informational Log Messages

ID	Log Message	No.	Description
151842	`FW Upgrade performed: new version is: %d.%d.%d.%d`	290	Performed router firmware upgrade, new version number is d.d.d.d.
151843	`REBOOT/SHUTDOWN Command from user. Code=%d`	291	User performed a router reboot or shutdown.
151889	`#%d: qapisetfcinterfaceparams_1_svc: FC port configuration changed`	337	Fibre Channel port configuration has been modified.
151890	`#%d: qapisetiscsiinterfaceparams_1_svc: iSCSI port configuration changed`	338	iSCSI port configuration has been modified.
151891	`#%d: qapisetisns_1_svc:iSNS configuration changed`	339	iSNS configuration has been modified.
151892	`qapisetntpparams_1_svc: NTP configuration changed`	340	NTP configuration has been modified.
151893	`#%d: qapisetvlanparams_1_svc: VLAN configuration changed`	341	VLAN configuration has been modified.
151896	`qapisetmgmintfcparams_1_svc:Management port configuration changed`	344	Management Ethernet port configuration has been modified.
151897	`qapisetbridgebasicinfo_1_svc:Bridge configuration changed`	345	Router configuration has been modified.
151898	`qapimapremote_1_svc: Remotemap added for local device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x`	346	Remotemap added for local Fibre Channel device WWPN xx.xx.xx.xx.xx.xx.xx.xx.

Table B-4. User Modules—Informational Log Messages (Continued)

ID	Log Message	No.	Description
151899	`qapimapremote_1_svc: Remotemap added to remote device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x`	347	Remotemap added for remote Fibre Channel device WWPN xx.xx.xx.xx.xx.xx.xx.xx.
151900	`qapiunmapremote_1_svc: Remotemap removed for local device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x`	348	Remotemap removed for local Fibre Channel device WWPN xx.xx.xx.xx.xx.xx.xx.xx.
151901	`qapiunmapremote_1_svc: Remotemap removed to remote device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x`	349	Remotemap removed for remote Fibre Channel device WWPN xx.xx.xx.xx.xx.xx.xx.xx.
151902	`qapimaptargettoinitiator_1_svc: Localmap added for initiator %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x`	350	Localmap added for Fibre Channel initiator WWPN xx.xx.xx.xx.xx.xx.xx.xx.
151903	`qapimaptargettoinitiator_1_svc: Localmap added to target device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x`	351	Localmap added to Fibre Channel target device WWPN xx.xx.xx.xx.xx.xx.xx.xx.
151904	`qapiunmaptargettoinitiator_1_svc: Localmap removed for initiator device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x`	352	Localmap removed for Fibre Channel initiator.
151905	`qapiunmaptargettoinitiator_1_svc: Localmap removed to target device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x`	353	Localmap removed to Fibre Channel target device.
151906	`qapimaptargettoinitiator_1_svc: Localmap added for initiator %s`	354	Localmap added for iSCSI initiator "iqn.dddd-dd.ttt.ttt.ttt.....".
151907	`qapiunmaptargettoinitiator_1_svc: Localmap removed for initiator %s`	355	Localmap removed for iSCSI initiator "iqn.dddd-dd.ttt.ttt.ttt.....".

Table B-4. User Modules—Informational Log Messages (Continued)

ID	Log Message	No.	Description
151908	`GE%d: Port status changed by user to ENABLED.`	356	User enabled GE port d.
151909	`GE%d: Port status changed by user to DISABLED.`	357	User disabled GE port d.
151910	`FC%d: Port status changed by user to ENABLED.`	358	User enabled Fibre Channel port d.
151911	`FC%d: Port status changed by user to DISABLED.`	359	User disabled Fibre Channel port d.
152069	`qapisetfcipparams_1_svc: FCIPROUTE %d Added`	517	FCIP route #d added.
152070	`qapisetfcipparams_1_svc: FCIPROUTE %d Modified`	518	FCIP route #d modified.
152071	`qapisetfcipparams_1_svc: FCIPROUTE %d Removed`	519	FCIP route #d removed.

FCIP Module

Table B-5 lists the informational log messages generated by the FCIP module.

Table B-5. FCIP Module—Informational Log Messages

ID	Log Message	No.	Description
184524	`qlFcip_Linkchange#%d: GigE Link Down`	204	FCIP Route GbE link d (1 or 2) is down.
184525	`qlFcip_Linkchange#%d: GigE Link Up`	205	FCIP Route GbE link d (1 or 2) is up.

TOE Driver

Table B-6 lists the informational log messages generated by the TOE driver.

Table B-6. TOE Driver—Informational Log Messages

ID	Log Message	No.	Description
217350	`QL3022:eth%x: Interface is down`	262	The GbE interface d (0 or 1) used for an FCIP route is down.

System Modules

Table B-7 lists the informational log messages generated by the system modules.

Table B-7. System Modules—Informational Log Messages

ID	Log Message	No.	Description
249862	`"Temperature is back to normal range %d\n"`	6	The router temperature has returned to the normal operating range and is d (C).

Error Log Messages

The following sections list and describe the error log messages by reporting module:

- "Application Modules" on page B-10
- "iSCSI Driver" on page B-18
- "Fibre Channel Driver" on page B-19
- "User Modules" on page B-22
- "System Modules" on page B-24

Application Modules

Table B-8 lists the error log messages generated by the application modules.

Table B-8. Application Modules—Error Log Messages

ID	Log Message	No.	Description
40967	`QLBA_NullDoorbell: driver unloaded, port disabled`	7	NULL doorbell routine for unloaded drivers. When a driver is unloaded, the doorbell routine is redirected to this NULL routine.
40996	`QLBA_ProcessTrb: Processing unsupported ordered tag command`	36	Processing unsupported ordered tag task management command.
41004	`QLBA_ProcessTrb: Processing unsupported head of queue tag command`	44	Processing unsupported head-of-queue task management command.
41058	`QLBA_CreateTargetDeviceObject: Too many devices`	98	Unable to create an object for the target device: exceeded the maximum number of target devices.
41060	`QLBA_CreateTargetNodeObject: Too many devices`	100	Unable to create an object for the target node: exceeded the maximum number of target devices.
41067	`QLBA_CreateLunObject: LunObject memory unavailable`	107	Memory unavailable for LUN object.
41077	`QLBA_CreateInitiatorObject: Too many initiators`	117	Unable to create an object for initiator object: exceeded the maximum number of initiators.
41096	`QLBA_DisplayTargetOperationStatus: PCI Error, Status 0x%.2x`	136	Process control block status indicates that a PCI error occurred during a target operation.
41106	`QLBA_DisplayInitiatorOperationStatus: DMA Error, Status 0x%.2x`	146	Process control block status indicates that a DMA error occurred during an initiator operation.

Table B-8. Application Modules—Error Log Messages (Continued)

ID	Log Message	No.	Description
41107	QLBA_DisplayInitiatorOperationStatus: Transport Error, Status 0x%.2x	147	Process control block status indicates that a transport error (protocol) occurred during an initiator operation.
41111	QLBA_DisplayInitiatorOperationStatus: Data Overrun, Status 0x%.2x	151	Process control block status indicates that a data overrun error occurred during an initiator operation.
41234	QLIS_LoginPduContinue: Operation failed. Initiator 0x%x, TPB status 0x%x	274	iSCSI login failed between receipt of PDU and request for the data segment.
41238	QLKV_ValidateLoginTransitCsgNsgVersion failed (status 0x%x)	278	iSCSI login failed due to unsupported version number in received login PDU.
41257	QLIS_LoginPduContinue: Invalid initiator name. Initiator:	297	iSCSI Login PDU contains invalid initiator name. The format and character set used to form the initiator name is invalid.
41265	QLIS_LoginPduContinue: Target not configured for Portal	305	iSCSI target login was attempted to a portal (iSCSI1 or iSCSI2) on which the target is not presented.
41267	QLIS_LoginPduContinue: Target not found. Target name:	307	iSCSI Login PDU received for a target with a target name unknown to the router.
41268	QLIS_LoginPduContinue: Missing target name	308	iSCSI Login PDU received without a target name for a normal session.
41270	QLIS_LoginPduContinue: TSIH is 0 but InitiatorName key/value not provided	310	iSCSI Login PDU received without an initiator name key/value.
41272	QLIS_LoginPduContinue: CONN_STATE_IN_LOGIN, Unknown InitTaskTag	312	iSCSI Login PDU received with an incorrect initiator task tag for a session which is partially logged in. This would occur if a login PDU other than the initial login PDU used an initiator task tag which was different than the initiator task tag provided in the initial login PDU.

Table B-8. Application Modules—Error Log Messages (Continued)

ID	Log Message	No.	Description
41283	`QLIS_LoginPduContinue: TSIH 0x%x out of range`	323	iSCSI Login PDU was received with a TSIH out of range. This would occur if the iSCSI initiator attempting the login failed to used the TSIH value provided in the Target Login Response PDU (router is target) in subsequent login PDUs.
41284	`QLIS_LoginPduContinue: Session does not exist, invalid TSIH 0x%x`	324	iSCSI Login PDU was received with an invalid TSIH value. The TSIH is invalid because there is no session with that TSIH value. This would occur if the iSCSI initiator attempting the login failed to used the TSIH value provided in the target login response PDU (router is target) in subsequent login PDUs.
41353	`QLIS_LoginPduContinue CHAP Validation Failure`	393	CHAP validation failed during login.
41354	`QLIS_LoginPduContinue Unexpected CHAP key detected`	394	Unexpected CHAP key.
41508	`QLBI_SetPortInfo: QLUT_AllocatePortalObject failed (PortType 0x%x, PortId 0x%x)`	548	Failed to allocate an object for *Set Port Info* IOCTL processing: PortType: 0 = Fibre Channel, 1 = iSCSI PortId: 0 = FC1 or iSCSI1(GE1), 1 = FC2 or iSCSI2 (GE2)
41626	`QLBI_GetLunInfo: INQUIRY failed, TPB status 0x%x`	666	Inquiry command failed. The Inquiry command was issued by the router as part of its discovery process.
41629	`QLBI_GetLunInfo: QLBI_PassthruCommand failed for INQUIRY (page code 0x83)`	669	Pass-Through command for Inquiry command for page 83 failed. The Inquiry command was issued by the router as part of its discovery process.

Table B-8. Application Modules—Error Log Messages (Continued)

ID	Log Message	No.	Description
41635	QLBI_GetLunInfo: QLBI_PassthruCommand failed for READ CAPACITY	675	Pass-Through command for Read Capacity command failed. The Read Capacity command was issued by the router as part of its discovery process.
41636	QLBI_GetLunInfo: READ CAPACITY failed, TPB status 0x%x	676	Read Capacity command failed. The Read Capacity command was issued by the router as part of its discovery process.
41696	QLBI_PassthruCommandCompletion: Passthru command aborted	736	Pass-Through command issued by management utiltiy (such as Router Manager) was aborted.
41700	QLBI_Passthru: Invalid CDB length %d bytes	740	Pass-Through command issued by management utility (such as the Router Manager) failed due to invalid CDB length.
41701	QLBI_Passthru: Invalid data length %d bytes	741	Pass-Through command issued by management utility (such as the Router Manager) failed due to invalid data length.
41717	QLBI_PassthruCommand: command interrupted or timed out	757	Pass-Through command issued by management application (such as the Router Manager) was interrupted or timed out.
41750	QLBI_Ioctl: ERROR: Operation (0x%x) not supported in this mode	790	IOCTL operation unsupported. Operation code provided in log message.
41768	QLBI_GetLunList: REPORT LUNS command failed	808	Report LUNs command failed. The Report LUNs command was issued by the router as part of its discovery process.

Table B-8. Application Modules—Error Log Messages (Continued)

ID	Log Message	No.	Description
41769	QLBI_GetLunList: REPORT LUNS command failed with CHECK CONDITION, SCSI STATUS 0x%02X	809	Report LUNs command failed with check condition status. The Report LUNs command was issued by the router as part of its discovery process.
41771	QLBI_GetLunList: Lun allocation failed for LunId %d	811	Failed to allocate LUN object: out of resources.
41994	QLFC_Login: VpIndex (%d) out of range	1034	Login attempted using Fibre Channel virtual port (VP) index that is out-of-range (range = 0–31). Index reported in log message.
41995	QLFC_Login: VP Index 0x%x not configured	1035	Login attempted using Fibre Channel VP index that has not been configured. Operation attempted on an unconfigured VP.
42002	QLFC_Login: Can't open connection	1042	Attempting login but Fibre Channel connection cannot be opened.
42024	QLFC_Logout: No active path to device. WWPN: %.2X%.2X%.2X%.2X%.2X%.2X%.2X%.2X	1064	Attempting logout of device for which there is no active path (WWPN not found).
42027	QLFC_Logout: VP Index 0x%x not configured	1067	Logout attempted using Fibre Channel VP index that has not been configured. Operation attempted on an unconfigured VP.
42068	QLFC_HandleTeb: System Error	1108	Event notification: Fibre Channel processor encountered a system error (unrecoverable firmware error).
42069	QLFC_HandleTeb: Driver Fatal Error	1109	Event notification: Fibre Channel driver encountered a fatal error.
42072	QLFC_HandleTeb: FC Logout	1112	Event notification: Fibre Channel port logged out.

Table B-8. Application Modules—Error Log Messages (Continued)

ID	Log Message	No.	Description
42242	QLIS_AllocateSessionObject: Out of session resources	1282	Failed to allocate object for iSCSI session: out of session resources.
42252	QLIS_EnqueueiScsiPdu: Duplicate PDU, CmdSN %d (0x%x), dropping it	1292	Received iSCSI PDU with duplicate command sequence number (CmdSN). Command PDU is dropped.
42258	QLIS_InstantiateSession: Can't add Initiator to the database	1298	Unable to allocate iSCSI initiator object while instantiating session.
42404	QLIS_ProcessStartTrb: [%d] CmdSN %ld is out of range (%ld - %ld), Cdb[0] 0x%02X, DataXferLen 0x%x.	1444	Failed to execute iSCSI Command PDU because its CmdSN is out-of-range. Log message contains the incorrect CmdSN, the valid CmdSN range, the first byte of the CDB, and the data length.
42648	QLIS_HandleTeb: Driver Fatal Error	1688	Event notification: iSCSI driver encountered a fatal error.
42649	QLIS_HandleTeb: Unload Driver	1689	Event notification: an IOCTL request was received to unload the iSCSI driver.
42654	QLIS_HandleTeb: iSNS Connection Failed	1694	Event notification: attempt to connect to the iSNS server failed.
43012	QLSC_CollectBUVUIO: Allocation of DSD failed	2052	iSNS connection failed.
43013	QLSC_CollectBUVUIORecover: Allocation of DSD failed	2053	Break up I/O DSD allocation failed.
43265	QLUT_AllocateTpbExtension: TPB allocation failed	2305	Break up I/O recover DSD allocation failed.
43267	QLUT_AllocateTpbExtension: Data buffer allocation failed (length %d)	2307	Data buffer allocation failed (length %d) during tpb extension allocation.

Table B-8. Application Modules—Error Log Messages (Continued)

ID	Log Message	No.	Description
43268	QLUT_AllocateTpbExtension: Alloc of DSD failed for buffer len %d	2308	Allocation of DSD failed during Tpb extension allocation. Buffer length %d.
43269	QLFCIP_IncomingFrame: BUGCHECK: Trb (0x%p) ValidFlag (0x%x) Direction (0x%x)	2309	FCIP incoming frame: BUGCHECK: Trb (0x%p) ValidFlag (0x%x) Direction (0x%x).
43270	QLFCIP_IncomingFrame: GetFcipMapPortal failed	2310	FCIP incoming frame: GetFcipMapPortal failed.
43271	QLFCIP_IncomingFrame: Got Status aborted pTrb->pBufDescList[0]:%p Trb Direction:0x%x	2311	FCIP incoming frame: Got Status aborted pTrb->pBufDescList[0]:%p Trb Direction:0x%x.
43272	QLFCIP_SystemError: System error	2312	FCIP system error.
43273	QLFCIP_SystemError: QLOP_IssuePortEnable failed	2313	FCIP system error: QLOP_IssuePortEnable failed.
43280	QLFCIP_HandleTeb: Driver Fatal error	2320	FCIP handle Teb: Driver Fatal error.
43281	QLFCIP_ConfigPortal: Find portal object failed for QLUT_TYPE_FC, PortId (%d)	2321	FCIP configure portal: Find portal object failed for QLUT_TYPE_FC, PortId (%d).
43282	QLFCIP_ConfigPortal: QLFCIP_ConfigPortal: Invalid PortId for FCIP link PortID(%d)	2322	FCIP configure portal: QLFCIP_ConfigPortal: Invalid PortId for FCIP link PortID(%d).
43283	QLUT_AllocateFcipTrbPool: Allocation failed (size 0x%x))	2323	FCIP allocate TRB pool: Allocation failed (size 0x%x).
43284	QLUT_GetFcipTrb: Null portal object in map table	2324	FCIP Trb: Null portal object in map table.
43285	QLUT_GetFcipTrb: Unable to get the Free Trb	2325	FCIP get TRB: Null portal object in map table.
43286	QLUT_GetFcipTrb: Duplicate allocation of FcipTrb (0x%p)	2326	FCIP get TRB: Duplicate allocation of FcipTrb (0x%p).
43287	QLUT_FreeFcipTrb: Null portal object in map table	2327	FCIP free TRB: Null portal object in map table.

Table B-8. Application Modules—Error Log Messages (Continued)

ID	Log Message	No.	Description
43288	QLUT_FreeFcipTrb: Duplicate Free of FcipTrb (0x%p)	2328	FCIP free TRB: Duplicate Free of FcipTrb (0x%p).
43289	QLUT_InitializeFcipBufDescPool: Memory allocation for FCIP_BUF_EXT_DESC failed (size 0x%x)	2329	FCIP initialize buffer descriptor pool: memory allocation for FCIP_BUF_EXT_DESC failed (size 0x%x).
43296	QLUT_FreeFcipDataBuffers: Duplicate Freeing of DataBuf (0x%p)	2336	FCIP free data buffers: Duplicate Freeing of DataBuf (0x%p).
43297	QLUT_AllocateFcipDataBuffers: Duplicate allocation of DataBuffer (0x%p)	2337	FCIP allocate data buffers: Duplicate allocation of DataBuffer (0x%p).
43298	QLUT_AllocateFcipDataBuffer: Got NULL PORTAL Object in map table MEM LEAK!!!!!	2338	FCIP allocate data buffer: Got NULL PORTAL Object in map table MEM LEAK.
43299	QLUT_DeallocateFcipDataBuffer: Null portal object in map table	2339	FCIP de-allocate data buffer: Null portal object in map table.
43300	QLUT_CreateFcipDataBufferpool: Allocation of 32K buffers from LargeBufferPool failed	2340	FCIP create data buffer pool: Allocation of 32K buffers from LargeBufferPool failed.
43521	QLSC_BreakupVUIOAllocPhase: TPB allocation failed	2561	Break up I/O: TPB allocation failed.
43522	QLSC_BreakupVUIOAllocPhase: Data buffer and TPB allocation failed	2562	Break up I/O: Data buffer and TPB allocation failed.

iSCSI Driver

Table B-9 lists the error log messages common to all iSCSI ports: 1 (GE1), 2 (GE2), 3 (GE3), and 4 (GE4). Log messages beginning with #0 denote iSCSI port 1 (GE1), #1 denotes iSCSI port 2 (GE2), #2 denotes iSCSI port 3 (GE3), and #3 denotes iSCSI 4 (GE4).

Table B-9. iSCSI Driver—Error Log Messages

ID	Log Message	No.	Descriiption
73990	`#%d: QLUtmIoctlEnable: Initialize FW failed`	262	The iSCSI processor failed firmware initialization.
74046	`#%d: QLPortUp: MBOX_CMD_SET_PORT_CONFIG %04x failed %04x`	318	The iSCSI processor command to enable a GE port failed.
74056	`#%d: QLRunDiag: MBOX Diag test internal loopback failed %x %x`	328	The iSCSI processor failed the internal loopback test.
74057	`#%d: QLRunDiag: MBOX Diag test external loopback failed %x %x`	329	The iSCSI processor failed the external loopback test.
74065	`#%d: QLPortDown: MBOX_CMD_SET_PORT_CONFIG %04x failed %04x`	337	The iSCSI processor command to disable a GE port failed.
74241	`#%d: QLiSNSEnableCallback: iSNS Server TCP Connect failed`	513	The iSCSI processor could not connect with the iSCSI name server (iSNS).
74577	`#%d: QLIsrDecodeMailbox: NVRAM invalid`	849	The iSCSI processor reported that the iSCSI port NVRAM contains invalid data (checksum error).
74587	`#%d: QLIsrDecodeMailbox: Link down`	859	The iSCSI processor reported a link down condition.
74656	`#%d: QLReadyTimer: Adapter missed heartbeat for %d seconds. Time left %d`	928	The driver failed to receive a heartbeat from the iSCSI processor for the specified number of seconds.
74661	`#%d: QLTimer: Abort pTpb=%p, Type %x, Timeout 0x%x DrvCount 0x%x, DdbIndex 0x%x`	933	The driver timed out an iSCSI processor operation and is aborting the operation.

Table B-9. iSCSI Driver—Error Log Messages (Continued)

ID	Log Message	No.	Descriiption
74663	`#%d: QLReadyTimer: MBOX_CMD %04x %04x %04x %04x %04x %04x %04x %04x timed out`	935	The driver timed out an iSCSI processor mailbox command.
74665	`#%d: QLReadyTimer: QLiSNSReenable failed.`	937	The driver timed out while attempting to reconnect with the iSNS.
74784	`#%d: QLUpdateInitiatorData: No more room in Initiator Database.`	1056	The driver's initiator database is full. The driver is capable of storing 1024 iSCSI initiators in its database. Use the CLI or Router Manager to remove unwanted/unused iSCSI initiators.
74800	`#%d: QLSetTargetData: No more room in Target Database.`	1072	The driver's target database is full. Use the CLI or Router Manager to remove unwanted/unused iSCSI targets.

Fibre Channel Driver

Table B-10 lists the error log messages common to both Fibre Channel ports, 1 (FC1) and 2 (FC2). Log messages beginning with #0 denote Fibre Channel port 1 (FC1); log messages beginning with #1 denote Fibre Channel port 2 (FC2).

Table B-10. Fibre Channel Driver—Error Log Messages

ID	Log Messages	No.	Description
106583	`#%d: QLUtmReceiveIo: Path invalid/FW No resource count %x`	87	The Fibre Channel processor received a SCSI command for an unknown target path or has run out of resources to execute additional commands.

Table B-10. Fibre Channel Driver—Error Log Messages (Continued)

ID	Log Messages	No.	Description
106589	`#%d: QLIoctlEnable: Adapter disabled`	93	The Fibre Channel processor was disabled by an IOCTL request to the driver.
106590	`#%d: QLIoctlEnable: Initialize FW error`	94	The Fibre Channel processor firmware failed initialization. The request to initialize was received by the driver in an IOCTL request.
106592	`#%d: QLIoctlRunDiag: Diagnostic loopback command failed %x % %x %x`	96	The Fibre Channel processor failed the external loopback test.
106593	`#%d: QLIoctlDisable: Re-initialize adapter failed`	97	The Fibre Channel processor failed to re-initialize in response to an IOCTL disable request.
106595	`#%d: QLUtmReceiveIo: Invalid VP Loop Id 0x%x`	99	Invalid Virtual Port loop ID.
106803	`#%d: QLIsrEventHandler: Link down (%x)`	307	The Fibre Channel processor reported a link down condition.
106813	`#%d: QLIsrEventHandler: Unexpected async event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x`	317	The Fibre Channel processor reported an unexpected asynchronous event. The mailbox registers provide status, event code, and data related to the event.
106846	`#%d: QLProcessResponseQueueFS: TRB is NULL: %d`	350	FCIP Response queue entry TRB pointer is NULL.
106853	`#%d: QLTimer: Link error count (0x%x) exceeded, link down`	357	The driver has determined that the Fibre Channel link is unreliable and unusable due to the number of errors encountered. The link has been taken down.
106912	`#%d: QLReserveLoopId: out of loop Ids`	416	The Fibre Channel processor was unable to obtain the number of loop IDs required. This failure occurs only when the Fibre Channel processor is running multi-ID firmware.

Table B-10. Fibre Channel Driver—Error Log Messages (Continued)

ID	Log Messages	No.	Description
106928	`#%d: QLMarkDeviceOffline: Device Id: %x marked offline, cLinkDownTimeout = %x, cPortDownRetryCount=%x`	432	The driver was unable to re-establish connection to the target within the timeout and retry counts, and is therefore marking it *offline*.
106948	`#%d: QLSnsGetAllNext: Name server login FAILED %x`	452	The Fibre Channel processor is unable to log into the Fibre Channel fabric name server.
107029	`#%d: QLUpdateDeviceData: out of slots in host database`	533	The driver's host (initiator) database is full.
107030	`#%d: QLUpdateDeviceData: out of slots in target database`	534	The driver's target database is full.
107041	`#%d: QLUpdateDeviceDatabase 0x%x: GET_ID failed %x`	545	The driver's target database is full.
107056	`#%d: QLUpdateDeviceDatabase 0x%x: out of slots in host database`	560	The driver's host (initiator) database is full. Maximum host database is 64.
107058	`#%d: QLUpdateDeviceDatabase 0x%x: MBOX_CMD_GET_VP_DATABASE failed %x`	562	Fibre Channel processor "Get VP Database entry command" failed.
107078	`#%d: QLUpdatePort 0x%x: out of slots in host database`	582	The drivers host (initiator) database is full.
107254	`#%d: QLUpdateSinglePortCont 0x%x: out of slots in host database`	758	No slots available in host database.
107267	`#%d: QLFcipIsrEventHandler: System error event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x`	771	FCIP system error event.

User Modules

Table B-11 lists the error log messages generated by the user modules.

Table B-11. User Modules—Error Log Messages

ID	Log Message	No.	Description
139265	QBRPC_Initialize: Entered	1	RPC (remote procedure call) server initialization entry point.
139266	QBRPC_Initialize:GetBridge Mem Allocation error	2	Get System API memory allocation failed.
139267	QBRPC_Initialize:GetBridgeAdv Mem Allocation error	3	Get System Advanced API memory allocation failed.
139268	QBRPC_Initialize:GetMgmt Mem Allocation error	4	Get Management API memory allocation failed.
139269	QBRPC_Initialize:GetIscsi Mem Allocation error	5	Get iSCSI API memory allocation failed.
139270	QBRPC_Initialize:GetIscsiAdv Mem Allocation error	6	Get iSCSI advanced API memory allocation failed.
139271	QBRPC_Initialize:GetIsns Mem Allocation error	7	Get iSNS API memory allocation failed.
139272	QBRPC_Initialize:GetFcIntfc Mem Allocation error	8	Get Fibre Channel Interface API memory allocation failed.
139273	QBRPC_Initialize:GetFcAdv Mem Allocation error	9	Get Fibre Channel Advanced API memory allocation failed.
139280	QBRPC_Initialize:GetFcSfp Mem Allocation error	16	Failed memory allocation for Get Fibre Channel SFP API.
139281	QBRPC_Initialize:GetLog Mem Allocation error	17	Failed memory allocation for Get Log API.
139282	QBRPC_Initialize:GetStats Mem Allocation error	18	Failed memory allocation for Get Statistics API.
139283	QBRPC_Initialize:InitListMem Allocation error	19	Failed memory allocation for Get Initiator List API.

Table B-11. User Modules—Error Log Messages (Continued)

ID	Log Message	No.	Description
139284	QBRPC_Initialize:TargetList Mem Allocation error	20	Failed memory allocation for Get Target List API.
139285	QBRPC_Initialize:LunList MemAllocation error	21	Failed memory allocation for Get LUN List API.
139286	QBRPC_Initialize:PresTarget Mem Allocation error	22	Failed memory allocation for Get Presented Targets List API.
139287	QBRPC_Initialize:LunMask Mem Allocation error	23	Failed memory allocation for Get LUN Mask API.
139288	QBRPC_Initialize:Init Mem Allocation error	24	Failed memory allocation for Initiator API.
139289	QBRPC_Initialize:TgtDevice Mem Allocation error	25	Failed memory allocation for Target Device API.
139296	QBRPC_Initialize:FcTgt Mem Allocation error	32	Failed memory allocation for Fibre Channel Target API.
139297	QBRPC_Initialize:BridgeStatus Mem Allocation error	33	Failed memory allocation for System Status API.
139298	QBRPC_Initialize:Diag Mem Allocation error	34	Failed memory allocation for Diagnostic API.
139299	QBRPC_Initialize:DiagLog Mem Allocation error	35	Failed memory allocation for Diagnostic Log API.
139300	QBRPC_Initialize:FruImage Mem Allocation error	36	Failed memory allocation for FRU Image API.
139301	QBRPC_Initialize:OemMfg Mem Allocation error	37	Failed memory allocation for OEM Manufacturing API.
139302	QBRPC_Initialize:Status Mem Allocation error	38	Failed memory allocation for Status API.
139303	QBRPC_Initialize:TcpIpStats Mem Allocation error	39	Failed memory allocation for TCP/IP Statistics API.
139304	QBRPC_Initialize:NtpStats Mem Allocation error	40	Failed memory allocation for NTP Status API.
139305	QBRPC_Initialize:LunList MemAlloc error	41	Failed memory allocation for LUN List API.
139315	QBRPC_FreeResources:Entered	51	RPC free resources entry point.

Table B-11. User Modules—Error Log Messages (Continued)

ID	Log Message	No.	Description
139553	`checkDuplicateIp: Detected Error %08x %08x%04x`	289	Detected duplicate IP address for management port.

System Modules

Table B-12 lists the error log messages generated by the system modules.

Table B-12. System Modules—Error Log Messages

ID	Log Message	No	Description
237572	`"Failed to kill sys killer %d\n"`	4	Failed to kill system task.
237573	`"Temperature over high threshold %d\n"`	5	Reporting router exceeds maximum operating temperature.

Fatal Log Messages

The following sections list and describe the fatal log messages by reporting module:

- “iSCSI Driver” on page B-24
- “Fibre Channel Driver” on page B-27
- “TOE Driver” on page B-29
- “System Modules” on page B-30

iSCSI Driver

Table B-13 lists the fatal log messages common to all iSCSI ports: 1 (GE1), 2 (GE2), 3 (GE3), and 4 (GE4). Log messages beginning with #0 denote iSCSI port 1 (GE1), #1 denotes iSCSI port 2 (GE2), #2 denotes iSCSI port 3 (GE3), and #3 denotes iSCSI 4 (GE4).

Table B-13. iSCSI Driver—Fatal Log Messages

ID	Log Message	No.	Description
69652	`#%d: qlutm_init: Diagnostic failed, invalid SRAM`	20	iSCSI processor SRAM test failed.
69653	`#%d: qlutm_init: Diagnostic failed, fail reboot`	21	iSCSI processor failed diagnostic reboot.
69654	`#%d: qlutm_init: Diagnostic failed, invalid NVRAM`	22	iSCSI processor failed NVRAM diagnostic.
69655	`#%d: qlutm_init: Diagnostic failed, invalid DRAM`	23	iSCSI processor failed DRAM diagnostic.
69656	`#%d: qlutm_init: Failed to return diagnostic result to Bridge`	24	iSCSI processor failed to return diagnostic results.
69941	`#%d: QLUtmProcessResponseQueue: Invalid handle %x EntryType %x`	309	Response queue entry contains an invalid handle.
69951	`#%d: QLSetNvram: QLRebootTimer failed AF %x RS %x Time %d`	319	Set NVRAM reboot timer failed.
69964	`#%d: QLDisable: QLRebootTimer failed AF %x RS %x Time %d`	332	Port disable reboot timer failed.
69966	`#%d: QLEnable: QLRebootTimer failed AF %x RS %x Time %d`	334	Port enable reboot timer failed.
70224	`#%d: QLProcSrblessiSNSResponse: Invalid handle %x`	592	iSNS response contains an invalid handle.
70400	`#%d: QLInitializeDevice: QLStartAdapter failed`	768	Start iSCSI processor failed.
70417	`#%d: QLInitializeAdapter: QLInitializeFW failed`	785	iSCSI processor firmware initialization failed.
70432	`#%d: QLDoInterruptServiceRoutine: PortFatal interrupt. PortFatalErrorStatus %08x CSR %08x AS %x AF %x`	800	iSCSI processor port fatal error.

Table B-13. iSCSI Driver—Fatal Log Messages (Continued)

ID	Log Message	No.	Description
70448	`#%d: QLStartAdapter: QLRebootTimer failed AF %x RS %x Time %d`	816	Start iSCSI processor reboot timer failed.
70489	`#%d: QLIsrDecodeMailbox: System Error 8002 MB[1-7] %04x %04x %04x %04x %04x %04x %04x`	857	iSCSI processor fatal system error.
70499	`#%d: QLProcessResponseQueue: Invalid handle for ET_PASSTHROUGH_STATUS`	867	Response queue invalid handle for ET pass-through.
70501	`#%d: QLProcessResponseQueue: Invalid entry type in response queue %x`	869	Response queue invalid entry type.
70502	`#%d: QLProcessResponseQueue: Invalid handle %x EntryType %x`	870	Response queue invalid handle for specified entry type.
70524	`#%d: QLProcessAen: Invalid event %x`	892	Asynchronous event for unknown event type.
70544	`#%d: QLRebootTimer: Reboot failed!`	912	Reboot timer failed.
70563	`#%d: QLReadyTimer: Adapter missed heartbeat for 0x%x seconds. Rebooting`	931	iSCSI driver missed iSCSI processor heartbeat. iSCSI processor rebooted.
70564	`#%d: QLReadyTimer: Abort pTpb=%p failed, DrvCount 0x%x`	932	iSCSI processor failed to complete operation before timeout.
70609	`#%d: QLProcessSystemError: Restart RISC`	977	iSCSI processor system error restart.
70610	`#%d: QLProcessSystemError: RebootHba failed`	978	iSCSI processor reboot failed.
70784	`#%d: QLConfigChip: invalid NVRAM`	1152	iSCSI processor NVRAM invalid (checksum error).
70835	`#%d: QLStartFw: MBOX_CMD_SET_FLASH failed %x`	1203	iSCSI Flash (NVRAM) command failed.

Table B-13. iSCSI Driver—Fatal Log Messages (Continued)

ID	Log Message	No.	Description
70836	`#%d: QLStartFw: Invalid Fw loader state 0x%x`	1204	iSCSI firmware loader invalid state.
70837	`#%d: QLStartFw: Load Fw loader timeout`	1205	iSCSI failed to load firmware in time allotted.

Fibre Channel Driver

Table B-14 lists the fatal log messages common to both Fibre Channel ports, 1 (FC1) and 2 (FC2). Log messages beginning with #0 denote Fibre Channel port 1 (FC1); log messages beginning with #1 denote Fibre Channel port 2 (FC2).

Table B-14. Fibre Channel Driver—Fatal Log Messages

ID	Log Message	No.	Description
102419	`#%d: qlutm_init: Diagnostic failed, port 1 invalid SRAM`	19	FC1 processor SRAM test failed.
102420	`#%d: qlutm_init: Diagnostic failed, port 1 POST failed`	20	FC1 processor power-on self-test (POST) failed.
102421	`#%d: qlutm_init: Diagnostic failed, port 2 invalid SRAM`	21	FC2 processor SRAM test failed.
102422	`#%d: qlutm_init: Diagnostic failed, port 2 POST failed`	22	FC2 processor POST failed.
102423	`#%d: qlutm_init: Failed to return diagnostic result to Bridge`	23	Fibre Channel processor failed to return diagnostic results.
102656	`#%d: QLInitializeAdapter: Reset ISP failed`	256	Fibre Channel processor failed reset.

Table B-14. Fibre Channel Driver—Fatal Log Messages (Continued)

ID	Log Message	No.	Description
102657	`#%d: QLInitializeAdapter: Load RISC code failed`	257	Fibre Channel processor firmware load failed.
102658	`#%d: QLInitializeAdapter: Load ISP2322 receive sequencer code failed`	258	Fibre Channel processor receive sequencer code load failed.
102659	`#%d: QLInitializeAdapter: Load ISP2322 transmit sequencer code failed`	259	Fibre Channel processor transmit sequencer code load failed.
102662	`#%d: QLInitializeAdapter: Verify Checksum command failed (%x)`	262	Fibre Channel processor firmware checksum failed.
102680	`#%d: QLInitializeFW: FAILED`	280	Fibre Channel processor firmware initialization failed.
102688	`#%d: QLInterruptServiceRoutine: Risc pause %x with parity error hccr %x, Disable adapter`	288	Fibre Channel processor paused due to internal parity error.
102689	`#%d: QLInterruptServiceRoutine: Invalid interrupt status: %x`	289	Fibre Channel processor returned an invalid interrupt status.
10691	`#%d: QLFcipInterruptServiceRoutine: Risc pause %x with parity error hccr %x, Disable adapter`	291	Fibre Channel processor invalid interrupt status.
10692	`#%d: QLFcipInterruptServiceRoutine: Invalid interrupt status: %x`	292	Fibre Channel processor paused due to RAM parity error.
102716	`#%d: QLIsrEventHandler: System error event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x`	316	Fibre Channel processor system error.
102746	`#%d: QLProcessResponseQueue: Invalid handle %x, type %x`	346	Response queue entry contains an invalid handle.

Table B-14. Fibre Channel Driver—Fatal Log Messages (Continued)

ID	Log Message	No.	Description
102747	`#%d: QLProcessResponseQueueFS: Invalid buffer type: %x`	347	FCIP: Response queue entry contains an invalid buffer type.
102748	`#%d: QLProcessResponseQueueFS: Invalid EntryType (0x%x)`	348	FCIP: Response queue entry contains an invalid entry type.
102749	`#%d: QLProcessResponseQueueFS: Invalid handle 0x%x, type 0x%x`	349	FCIP: Response queue entry contains an invalid handle.
102752	`#%d: QLTimer: Ext Ram parity error exceed limit cnt 0x%x, limit 0x%x, Disabled adapter`	352	Fibre Channel processor external SRAM parity error count exceeded limit: Fibre Channel port disabled.
102755	`#%d: QLTimer: Heartbeat failed`	355	Fibre Channel processor heartbeat failed.
102800	`#%d: QLRestartRisc: restart RISC`	400	Fibre Channel processor being restarted.

TOE Driver

Table B-15 lists the fatal log messages generated by the TOE driver.

Table B-15. TOE—Fatal Log Messages

ID	Log Message	No.	Description
200721	`QL3022:ql3xxx_probe: Adapter eth#%d, Invalid NVRAM parameters`	17	Encountered invalid parameters in TOE NVRAM.
200725	`QL3022:eth%x: Resetting chip. PortFatalErrStatus register = 0x%x`	21	TOE chip reset due to detection of fatal error.

System Modules

Table B-16 lists the fatal log messages generated by the system modules.

Table B-16. System—Fatal Log Messages

ID	Log Message	No.	Description
233473	`"memory monitor: Detected Uncorrectable Ecc %08lx system is rebooting in 5 secs\n"`	1	Uncorrectable memory error detected at address provided in log message.
233474	`"Failed to register interrupt handler!\n"`	2	Attempt to register the interrupt handler failed.
233475	`"%s class_simple_create failed\n"`	3	Failed class_simple_create system call from memory monitor initialization routine.

Glossary

activity LED

A port LED that indicates when frames are entering or leaving the port.

adapter

The board that interfaces between the host system and the target devices. Adapter is synonymous with *host bus adapter (HBA)*, *host adapter*, and a*dapter board*.

adapter port

A port on the adapter board.

adapter port beacon

An LED on the adapter. Flashing it enables you to locate the adapter.

arbitrated loop

A circular (ring) topology (versus point-to-point) where two or more ports can be interconnected, but only two ports can communicate at a time. All communication passes through all ports connected to the loop.

bandwidth

A measure of the volume of data that can be transmitted at a specific transmission rate. A 1Gbps or 2Gbps Fibre Channel port can transmit or receive at nominal rates of 1 or 2Gbps, depending on the device to which it is connected. This corresponds to actual bandwidth values of 106MB and 212MB, respectively.

challenge-handshake authentication protocol

See CHAP.

CHAP

Challenge-handshake authentication protocol. CHAP is used for remote logon, usually between a client and server or a Web browser and Web server. A challenge/response is a security mechanism for verifying the identity of a person or process without revealing a secret password that is shared by the two entities. CHAP is also referred to as a *three-way handshake*.

CLI

Command line interface. A program interface driven by entering commands and parameters.

command line interface

See CLI.

device

A target, typically a disk drive. Hardware such as a disk drive, tape drive, printer, or keyboard that is installed in or connected to a system. In Fibre Channel, a *target* device.

DHCP

Dynamic host configuration protocol. Enables computers on an IP network to extract their configuration from servers that have information about the computer only after it is requested.

driver

The software that interfaces between the file system and a physical data storage device or network media.

E_Port

Expansion port. A port in a Fibre Channel switch that connects to another Fibre Channel switch or bridge device by an inter-switch link. E_Ports are used to link Fibre Channel switches to form a multi-switch fabric.

EEPROM

Electrically erasable programmable read-only memory. Memory that can be erased (entirely, not selectively) using higher electrical voltages.

electrically erasable programmable read-only memory

See EEPROM.

Enhanced Ethernet

Also called *data center Ethernet* or *converged enhanced Ethernet*. Refers to new enhancements to the existing Ethernet standard that eliminate Ethernet's inherently lossy nature and make 10Gb Ethernet a viable storage networking transport.

Ethernet

The most widely used LAN technology that transmits information between computer, typically at speeds of 10 and 100 million bits per second (Mbps).

expansion port

See E_Port.

F_Port

The *fabric* port in a Fibre Channel fabric switch provides a point-to-point link attachment to a single N_Port. F_Ports are intermediate ports in virtual point-to-point links between end ports, for example N_Port to F_Port to F_Port to N_Port using a single Fibre Channel fabric switch.

fabric

A fabric consists of cross-connected Fibre Channel devices and switches.

fabric loop port

See FL_Port.

fabric port

A F_Port or FL_Port.

fabric switch

Also, switched fabric. A fabric switch connects multiple devices from independent Fibre Channel-arbitrated loops (FC-ALs) and point-to-point topologies into a fabric using Fibre Channel switches.

failover path

Software feature that ensures data availability and system reliability by assigning alternate path and automatic adapter failover for device resources. This feature is available only in Windows 2000/Windows Server 2003/Windows Vista, Novell NetWare, and Red Hat/SUSE Linux. (Windows XP and Windows Server 2008 do *not* support failover.)

FC

See Fibre Channel.

FC-IP mode

Data transportation mode in which the iSR6152 transports Fibre Channel frames over a TCP/IP connection using the FCIP protocol to connect two iSR6152 routers. In FC-IP mode, a port pair (one Fibre Channel port and an IP port on the same router) on local iSR6152 and another port pair on a remote router form an FCIP route.

FCIP

Fibre Channel over IP. Protocol that enables transmission of Fibre Channel information by tunneling data on a SAN over IP networks.

FCP

Fibre Channel protocol. SCSI to Fibre Channel mapping.

Fibre Channel

A high-speed serial interface technology that supports other higher layer protocols such as SCSI and IP.

Fibre Channel over IP

See FCIP.

field replaceable unit

See FRU.

FL_Port

Fabric loop port. In Fibre Channel, the fabric switch is capable of Fibre Channel arbitrated loop operations and is connected to one or more NL_Ports by a Fibre Channel Arbitrated Loop. An FL_Port becomes a shared entry point for public NL_Port devices to a Fibre Channel fabric. FL_Ports are intermediate ports in virtual point-to-point links between end ports that do not reside on the same loop, for example NL_Port to FL_Port to F_Port to N_Port through a single Fibre Channel fabric switch.

Flash

Non-volatile memory where the boot code is saved. At times, Flash and *boot code* are used interchangeably.

Flash BIOS

A QLA2*xxx* adapter's Flash programmable read-only memory (PROM) contains the code that allows booting from the adapter at startup.

frame

Data unit consisting of a start-of-frame (SOF) delimiter, header, data payload, CRC, and an end-of-frame (EOF) delimiter.

FRU

Field replaceable unit. Component that can be replaced in the field upon failure.

G_Port

Generic port. A port that can operate as either an E_Port or an F_Port. A G_Port can determine operating mode at switch port initialization, F_Port when an N_Port attachment is determined, E_Port when an E_Port attachment is determined. See E_Port, F_Port, FL_Port, L_Port, N_Port, NL_Port.

generic port

See G_Port.

heartbeat LED

A chassis LED that indicates the router status.

hot replaceable

Also known as *hot swappable*, this means you can add new devices or remove existing ones when the system is running.

IANA

Internet Assigned Numbers Authority (IANA) is responsible for the global coordination of the DNS root, IP addressing, and other Internet protocol resources.

initiator

System component, such as a network interface card, that originates an I/O operation.

Internet Assigned Numbers Authority

See IANA.

Internet Protocol

See IP.

Internet small computer system interface

See iSCSI.

IOCTL

Input/output control. A system call in UNIX/Linux systems that allows an application to control or communicate with a device driver outside usual read/write operations.

IP

Internet Protocol. A method by which data is sent from one computer to another over the Internet. IP specifies the format of packets, also called *datagrams*, and the addressing scheme.

iSCSI

Internet small computer system interface. Protocol that encapsulates data into IP packets to send over Ethernet connections.

iSNS

Internet simple name service is used for discovery and management of IP-based SANs.

jumbo frames

Large IP frames used in high-performance networks to increase performance over long distances. Jumbo frames generally means 9,000 bytes for Gigabit Ethernet, but can refer to anything over the IP MTU, which is 1,500 bytes on an Ethernet.

L_Port

Loop port. Does arbitrated loop functions and protocols. NL_Ports and FL_Ports are examples of loop-capable ports. See E_Port, F_Port, FL_Port, G_Port, N_Port, NL_Port.

loop port

See loop port.

latency

A measure of how fast a transaction travels through the router.

LIP

Loop initialization process. The initialization process in an arbitrated loop that occurs when the loop is powered up or a new device is added. One function of a LIP is to assign addresses. All data transmission on the loop is suspended during a LIP.

load balancing

A software feature that improves system performance by balancing device access between multiple ports for maximum resource efficiency.

loop initialization process

See LIP.

loopback

Diagnostic tool that routes transmit data through a loopback connector back to the same adapter.

LUN

Logical unit number, a subdivision of a SCSI target. It is the small integer handle that differentiates an individual disk drive or partition (volume) within a common SCSI target device such as a disk array.

A LUN can be a single physical disk drive, multiple physical disk drives, or a portion (volume) of a single physical disk drive. However, LUNs are typically not entire disk drives but rather virtual partitions (volumes) of a RAID set.

Using LUNs, the Fibre Channel host can address multiple peripheral devices that may share a common controller.

maintenance button

Multifunction momentary switch on the front panel of the router.

management workstation

PC workstation used to manage routers remotely by connecting to the routers using SANsurfer Router Manager or CLI commands.

maximum transmission unit

See MTU.

media

Physical-layer information carriers. Fibre Channel supports several different physical media: copper, multimode optical, and single-mode optical. All Fibre Channel protocols are supported on all media.

MIB

Management information base. A set of guidelines and definitions for SNMP functions.

MTU

Maximum transmission unit. Refers to the size (in bytes) of the largest packet (IP datagram) that a specified layer of a communications protocol can transfer.

N_Port

Node port. Connects by a point-to-point link to either a single N_Port or a single F_Port. N_Ports handle creation, detection, and flow of message units to and from the connected systems. N_Ports are end ports in virtual point-to-point links through a fabric, for example N_Port to F_Port to F_Port to N_Port using a single Fibre Channel fabric switch. See also FL_Port.

NL_Port

Node loop port. A port capable of arbitrated loop functions and protocols. An NL_Port connects through an arbitrated loop to other NL_Port and at most a single FL_Port. NL_Ports handle creation, detection, and flow of message units to and from the connected systems. NL_Ports are end ports in virtual point-to-point links through a fabric, for example NL_Port to F_Port to F_Port to N_Port using a single Fibre Channel fabric switch. In the absence of a fabric switch FL_Port, NL_Ports can communicate with other NL_Ports in virtual point-to-point links through an FC_AL open loop circuit often through FC_AL (Arbitrated Loop) hub or loop switch devices. See: E_Port, F_Port, FL_Port, G_Port, N_Port.

network time protocol

See NTP.

non-volatile random access memory

See NVRAM.

NTP

Network time protocol. NTP is used for distributing the Coordinated Universal Time (UTC) by means of synchronizing the clocks of computer systems over packet-switched, variable-latency data networks.

NVRAM

Non-volatile random access memory. NVRAM is a type of memory that retains data (including configuration settings) even when power is removed. You can configure NVRAM settings manually or restore them from a file.

path

A path to a device is a combination of a adapter port instance and a target port as distinct from internal paths in the fabric network. A fabric network appears to the operating system as an opaque network between the adapter (initiator) and the target.

Because a path is a combination of an adapter and a target port, it is distinct from another path if it is accessed through a different adapter and/or it is accessing a different target port. Consequently, when switching from one path to another, the driver might be selecting a different adapter (initiator), a different target port, or both.

This is important to the driver when selecting the proper method of failover notification. It can make a difference to the target device, which might have to take different actions when receiving retries of the request from another initiator or on a different port.

point-to-point

Also FC-P2P. Two Fibre Channel nodes directly connected (not in a loop).

port

Access points in a device where a link attaches. There are four types of ports, as follows:

- N_Port—a Fibre Channel port that supports point-to-point topology.
- NL_Port—a Fibre Channel port that supports loop topology.
- FL_Port—a port in a fabric where an N_Port can attach.
- FL_Port—a port in a fabric where an NL_Port can attach.

port instance

The number of the port in the system. Each adapter may have one or multiple ports, identified with regard to the adapter as port 0, port 1 and so forth. To avoid confusion when dealing with a system containing numerous ports, each port is assigned a port instance number when the system boots up. So Port 0 on an adapter might have a port instance number of 8, for example, if it is the eighth port discovered by the system.

POST

Power-on self test. Diagnostics that the router performs at start-up.

power-on self test

See POST.

reduced instruction set computer

See RISC.

registered state change notification

See RSCN.

RISC

Reduced instruction set computer. A computer microprocessor that performs fewer types of computer instructions, thereby operating at higher speeds.

RSCN

Registered state change notification. RSCN is a Fibre Channel fabric notification sent to all specified nodes when any major fabric changes occur. This notification allows nodes to immediately gain knowledge about the fabric and react accordingly.

router log

Log of messages describing events that occur on the intelligent storage router.

SAN

Storage area network. Multiple storage units (disk drives) and servers connected by networking topology.

SANsurfer Router Manager

Workstation-based router management utility that provides a graphical user interface (GUI) used to configure and monitor intelligent storage routers.

SCSI

Small computer system interface. A high-speed interface used to connect devices, such as hard drives, CD drives, printers, and scanners, to a computer. The SCSI can connect many devices using a single controller. Each device is accessed by an individual identification number on the SCSI controller bus.

SFP

Small form-factor pluggable. A transceiver device, smaller than a GigaBit Interface Converter, that plugs into the Fibre Channel port.

simple network management protocol

See SNMP.

small computer system interface

See SCSI.

small form-factor pluggable

See SFP.

SNMP

Simple network management protocol. SNMP is a networking protocol that enables you to monitor the router using third-party applications that use SNMP.

storage area network

See SAN.

target

The storage-device endpoint of a SCSI session. Initiators request data from targets. Targets are typically disk-drives, tape-drives, or other media devices. Typically a SCSI peripheral device is the target but an adapter may, in some cases, be a target. A target can contain many LUNs.

A target is a device that responds to a requested by an initiator (the host system). Peripherals are targets, but for some commands (for example, a SCSI COPY command), the peripheral may act as an initiator.

TCP

Transmission control protocol. A set of rules to send data in packets over the Internet protocol.

TOE

TCP/IP offload engine. Technology for improving TCP/IP performance by offloading processing onto a state-based offload engine directly on the adapter.

virtual logical area network

See VLAN.

VLAN

Virtual logical area network (LAN). A group of hosts with a common set of requirements that communicate as if they were attached to the same wire, regardless of their physical location. Although a VLAN has the same attributes as a physical LAN, it allows for end stations to be grouped together even if they are not located on the same LAN segment. VLANs enable network reconfiguration through software, instead of physically relocating devices.

world wide name

See WWN.

world wide node name

See WWNN.

world wide port name

See WWPN.

WWN

World wide name. A unique 64-bit address assigned to a device by the device manufacturer.

WWNN

World wide node name. A unique 64-bit address assigned to a device.

WWPN

World wide port name. A unique 64-bit address assigned to each port on a device. One WWNN may contain multiple WWPN addresses.

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